BUSINESS NETWORKS AND THE KNOWLEDGE-DRIVEN ECONOMY
Business networks and the knowledge-driven economy

An empirical study carried out in Europe and Canada

by Louis Lengrand and Isabelle Chatrie

A study commissioned by the Enterprise Directorate-General

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A great deal of additional information on the European Union is available on the Internet. It can be accessed through the Europa server (http://europa.eu.int).

Cataloguing data can be found at the end of this publication.

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Foreword

The knowledge economy is driven by new factors of production and sources of competitive advantage such as innovation, design, branding, and know-how. These factors are valid for all industries from retailing and car manufacturing to finance and software. As ideas, information and knowledge for the production of, for instance, a car are seldom held by one single person or a single company, collaborative networks are fast becoming the basic units for innovation and production in this new economy. Companies are embedded within networks, such as the supply chain, technology transfer brokers, board members, and investors, which all contribute to the corporate knowledge.

Knowledge networks should be seen as a scheme which would permit the way between the supplier and user of information to be shortened. It builds on existing relays, which are encouraged to give access to knowledge to their business constituency. Those relays should be linked with similar initiatives and thus favour intersectoral and interregional cooperation.

With the concept of knowledge networks, we enter a new era by accepting to assess not only internal values but equally the values that are external to the enterprise. In order to valorise external resources, two factors are required. Firstly, the company must have the appropriate tools and capacity to communicate and to stock the external knowledge according to its needs. Secondly, it must have put in place appropriate processes to assure an optimum diffusion of this knowledge among its staff in order to exploit the knowledge and generate added value. In other words, develop a new knowledge management process.

This study analyses the knowledge networks on an empirical base, i.e. operational occurrences of business networks chosen from six Member States and Canada. Only when illustrated by implementation at local/regional and/or sector-specific level, knowledge networks become operational and their functions and knowledge-based services understood. This knowledge-sharing approach is still in embryo stage but perceived as imperative for creating a flexible and competitive business environment.

Enterprise Directorate-General
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The study team has brought together:

Emilio Bellini, Odisseo, Naples, Italy
Paul Butler, Nexus Research, Dublin, Ireland
Morgan Carpenter, Nexus Research, Dublin, Ireland
Philippe Chatrié, LL&A, Versailles, France
Benoit Guay, DMR, Montreal, Canada
Castulus Kolo, Fraunhofer Institute, Karlsruhe, Germany
Anke Matuschewski, Fraunhofer Institute, Karlsruhe, Germany
Roy Tubb, Upper Savo Development Company, Finland
Paul Wraight, LL&A, Versailles, France

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EXECUTIVE SUMMARY

It has now become widely accepted that the competitiveness of enterprises is crucial for growth and employment, in view of the European industrial fabric.

Traditional ingredients have been innovation and R & D, efficient processes, permanent productivity gains and optimised allocation of resources, state-of-the-art marketing practice, improved international presence and, last but not least, sound management of human resources.

Experts and writers in management science have been quite prolific over the years, helping actors to manage change, and in the recent past, the new global environment has led many of them to stress the importance of two operational models: the knowledge era and the networked economy.

Neither knowledge nor networks are new concepts per se. The new factor is the rapidly evolving technological environment, which changes the rules of many games (paradigms) and thus poses new opportunities, but also new threats.

From a business management perspective, there is a growing need to rationalise access to, and use of, sources of knowledge, defined as information contextually connected to action. There is also a need to exploit actively the potential in latent networks, such as geographical or professional groups.

However, many barriers to these evolutions must be overcome.

- The raising of the degree of information and communications technology (ICT) literacy among heads of industrial companies, although substantial progress has already been achieved, remains a medium-term goal.
- Knowledge management is a powerful concept but is quite demanding in terms of methodology and tools.
- Collaborative action between enterprises and strong networking practices at cluster level only develop slowly across Europe, with some exceptions.

Most public bodies in charge of economic development at local/regional or national level, having recognised in particular the role of small and medium-sized enterprises (SMEs), are increasingly aware of the abovementioned developments and opportunities, and also of barriers.

Accordingly, adding a major impulse to the overall still limited spontaneous development of ICT-based wide-purpose clubs of companies, they tend to multiply initiatives with an aim to facilitate access to shared information resources and services and/or to raise ICT awareness, and often to catalyse cooperation between companies.

In parallel, private business networks develop with a narrower scope, such as supply chain integration or cooperative marketing.

Today’s analyst is thus confronted with a wide spectrum of ICT-based business networks and knowledge-focused knowledge resource networks. Network patterns differ widely and in many cases the difference is not clear-cut between partners, network nodes and end-users.
A closer look at the networks’ objectives, partnership and information flows, together with a factual analysis of services, funding patterns, etc., helps in formalising a tentative typology of initiatives, which, in turn, is useful in reaching a reasonably structured view of success factors, of performance indicators and of longer-term sustainability.

In between the two extremes, the single-purpose cooperation between advanced ICT users, on the one hand, and the nationwide one-stop shop portal to business-focused resources, on the other, coexist a variety of projects and initiatives with different ambitions, scopes, levels of development, IT-platform sophistication, etc.

What most of these have in common is that they see themselves very much as a laboratory, but declare that they are ‘here to stay because they deliver value’, which comes as a contrast to their quite remote concern with performance. Thus, the ‘lab feel’ does not encourage the preparation of sound medium-term strategies.

Some networks are quite innovative and have probably reached ‘best practice’ status, but limited dissemination or exchange is taking place, in particular at transnational level.
Part I

An assessment of the knowledge resource networks concept
1.1. The knowledge era

While the factors which influence company competitiveness are increasingly critical to company success, their very nature has evolved as the environment has moved from the industrial era to the knowledge era:

- Physical assets ........................................... Intangible assets
- Fragmented tasks ....................................... Integrated/coordinated tasks
- Mass marketing .......................................... Just-in-time products
- Operational efficiency ................................. Innovation, new knowledge
- Management control ................................. Common goals and objectives
- Training ....................................................... Lifelong learning/training
  (just in time and just enough time)

New business patterns are characterised by diminishing geographical and time boundaries, globalisation of the labour market, increased connectivity, extended or virtual companies, new forms of customer management and individualised marketing.

Against this background, new constraints have emerged in the management of human resources, increasing the risk of losing vital knowledge. This is a consequence of the shortage of key expertise, greater staff turnover and mobility, and the gradual shift from company-based to profession-based loyalty.

As a result, a wide range of knowledge-based issues require responses, such as new methods and processes, identification and dissemination of best practice, technology information, market analysis, industry knowledge, knowledge transfer and education.

Certain types of information are easily standardised, formatted and transferred. But the main challenge is to transform ‘information’ into ‘knowledge’, i.e. ‘information contextually connected to action’. The ways in which businesses capture, associate, circulate, share, capitalise, innovate and transform information into actions, products and services are evolving as new systems — formats, processes and relational schemes — come into being. This requires new formats, processes and relational schemes; in a nutshell, this leads to the implementation of knowledge management methods and tools.

The appropriate restructuring of knowledge-oriented business processes relies on the capacity to implement technical and relational tools:

- ‘Technical tools’ refer to the adoption and optimisation of new information and communications technologies (LANs, WANs, client-server architecture, mobile telephones, Internet/intranet, telematic applications such as teleconferencing, teleworking, etc.). The usage and functionalities of new ICT should be improved; information systems should be redesigned and new electronic relational databases and groupware technologies should be made available.

- ‘Relational tools’ refer to the need to engage in a strategic restructuring of the way of doing business, both in its internal and external environments. As regards the external environment, cooperation is increasingly being seen as an effective way of widening the knowledge base that is available to firms and increasing the effectiveness of its use.
1.2. Inter-firm cooperation networks: a historical perspective leads into today’s realities

The emergence of the concept of the network in sociology and communication was bound to further its emergence in economics and management. However, this emergence came rather late, slowed down by the dominant influence of classical and neoclassical theories inherited from Adam Smith and based on the ‘economic individualism’ grounded in the search for maximum profit by individuals and autonomous economic actors engaged in sharp competition. Given a situation where economic actors were in general obsessed only by their individual interests and where those operating in the same sector perceived each other as economic opponents, there could have been no opening for the emergence of inter-firm cooperation networks.

Gradually, economists realised that economic actors are not entirely rational and that in general their economic choices reflect a limited rationality because they only have a limited knowledge of the market. Competition in the market (through prices) does not constitute the only form of coordination of economic relations and, thus, economic actors find more satisfactory modes of economic regulation through new organisational forms, in particular through different forms of cooperation between firms. Joint ventures, consortia, licensing agreements or more complex networks such as purchase or supply chain networks have multiplied.

Thus, two steps can be distinguished over the last 20 years, which have seen a rapid development of cooperation networks:

- ‘Technological networks’ can be perceived as the first form of cooperation networks. These began with big firms which started technological alliances in order to reduce R & D costs and uncertainties and also to allow firms to adapt to the speed of technological evolution. Since then, this phenomenon has been observed in regional economies and explained as a consequence of ‘aggregation effects’, i.e. a process of geographical concentration in which technological firms can benefit from research activities carried out by the universities and public laboratories of the region and also from national or regional government incentive programmes. These first forms of inter-firm cooperation networks can be called the ‘local networks of innovators’ or ‘regional innovation networks’ or ‘technological networks’. The first science and technological parks or technopoles are clearly an expression of this process. The industrial districts in Italy are another type, even if the basic principles are more complex and not only based on technological cooperation.

- ‘Knowledge networks’ now appear as a new form of cooperation network and take multiple forms. They have been multiplying for the past five years under the combined impact of the rapid evolution of consumer needs and lifestyles, the increase in worldwide competition, a redefinition of the role of the public authorities in economic development, and, as a major factor, the revolutionary changes in information and communications technologies (ICTs) which have led to the ‘information revolution’ and the ‘knowledge-driven economy’.

1.3. Knowledge networks as an intangible asset

Productivity is no longer seen as an ‘additional productivity of operations’ but rather as a ‘systemic productivity of relations’ where a firm’s competitiveness depends on the productivity of its ‘interfaces’ or ‘interactions’. These new criteria require a new organisational and functional paradigm where the performance of firms depends on the density and pertinence of relations and cooperation between the actors of the productive system (other firms, suppliers, financiers, research institutions, education, regional development agencies, etc.) through collaborative networks and clustering.

Thus, knowledge networks represent a further step, where capacities and rights to access a value located outside the company are developed.

In this regard, the search for a more truthful representation of the global value of companies has led to several intangible elements in addition to simple physical assets being taken into account. Classic examples, with which general accounting practices are already in line, include different elements of intellectual property (e.g. patents), as well as commercial property (e.g. clienteles). Several other factors are now analysed, among which are human capital, innovation capital, process know-how, etc.
However, the common denominator between these categories of intangible assets is that the value stays within the company.

Accepting the setting of value at company level on what may appear as no more than just potentiality or virtuality will rely on the fulfilment of two conditions: firstly, that adequate tools for knowledge storage and further delivery will enable the repatriation of these external resources to the company according to its needs; secondly, that appropriate processes are implemented to ensure optimal internal dissemination of knowledge and the involvement of end-users, thus applying a multiplying effect to value generation.
CHAPTER 2: OVERCOMING BARRIERS

2.1. Preliminary remarks

For many European companies, in particular SMEs, especially when they belong to the more traditional manufacturing sectors, this new rapidly evolving business reality and the need for these technical and relational tools are poorly evaluated.

Many enterprises have not, as yet, perceived the importance of knowledge assets as a crucial factor of value and competitiveness. Also, they keep at a distance from the new ICTs and stick to the old Taylorian paradigm. Managers are often sceptical about or distrustful of collaborative actions and they fail to recognise the benefits of collaboration. Even where interest has been raised, company heads frequently lack the necessary human, technical and financial resources and knowledge to access these resources or to participate in collaborative actions.

In June 1995, the Competitiveness Advisory Group report, entitled ‘Enhancing European competitiveness’, strongly encouraged new schemes which would permit the shortening of the distance between suppliers and users of information. Of critical importance was the recognition that Europeans from different sectors of society can and should collaborate to supplement and enhance the capacity of the Community's innovation system and market economy.

The Competitiveness Advisory Group (CAG) emphasised the importance of trying 'to explore the potential of the information society, and avoid the risk of it turning into a new source of inequalities between firms, regions or individuals' and the report identified the need for a concerted European approach in the form of self-sustaining knowledge resource centres.

These KRCs would be linked in networks to enhance synergy and ensure a Europe-wide framework for individual experiences. These networks would facilitate information supply and demand and play a leading role in enhancing developments in the information society.

What are the preferred ways to help companies identify the relevant challenges of knowledge management and to invest in processes based on new technologies and new relational patterns?

In order to provide the widest possible coverage of this particular issue, the reference field has been extended to the projects participating in the Epsilon initiative (1), which is closely linked to the knowledge resource networks study, because barriers to the development of ICT-based business networks have been an important topic for Epsilon project work and specialised seminars.

2.2. Overcoming barriers to awareness raising

As there is wide variation between the aims and the types of enterprise served by the different networks, a number of different obstacles and barriers to ICT awareness raising in companies are encountered and a wide variety of solutions have been employed to overcome them. However, it is possible to identify key problems and, by focusing on case studies, identify the solutions that have been developed.

In many instances, it is possible to identify low levels of initial ICT knowledge and resultant apprehension about its use, concern as to whether ICTs really can bring to the company the potential benefits ascribed to them, a reluctance to use the full potential of ICTs in all areas of the business and an initial preference for traditional working practices as the central psychological barriers to ICT awareness raising. Additional practical barriers centre around a reluctance on the behalf of companies to pay for ICT services and a lack of initial trust in the motives of ICT providers.

Strategies that have been employed to overcome these barriers have focused on educating enterprises about ICTs and motivating businesses to take them on board for themselves. Central to all the strategies involved are the use of language understood by companies, the demonstration of the specific uses of ICTs for the economic sector in which the company is active, the promotion of practical ICT applications rather than ICT generally, the incorporation of trusted partners (universities, business organisations, local authorities) in the network and the provision of a quality of service that justifies any cost incurred by the end-user.

However, in the longer-term, the most effective way of overcoming obstacles and barriers to raising ICT awareness is the creation and cultivation of a positive loop of increased ICT use. Through such a loop, initial exposure to ICT and its diffusion within the market place in which companies operate would enable them to see for themselves the added value of ICT, or see their competitors gaining an advantage through the use of ICT. Increased use of ICT (learning by doing) will lead to a diminution of the ICT knowledge gap within companies and the use of ICT in a competitive environment will drive initiative and innovation.

More specifically:

*The difficulty of convincing SMEs of the worth of value added network services and persuading companies to contribute, both financially and in terms of time and information, to the development and maintenance of the network.*

An approach to this issue has been to commission a detailed external evaluation of the network in order to highlight the qualitative and quantitative benefits which it gives to the membership. This approach is complementary to the network's clear marketing plan that aims to generate long-term input and commitment from its end-users.

*The fear of technology on the part of some companies and the notion that ICT providers within a network will exploit their privileged position to sell them unnecessary and expensive equipment and services.*

It has been found that non-profit-making organisations within the network have a very important role to play in developing the trust of companies in this regard. However, experience also shows that it is essential that the network's services and support systems be of sufficient quality to justify any costs incurred by companies in their implementation and use. The local factor is essential, as the successful use of ICT in local businesses acts as an influential pull factor bringing the value added nature of ICT to the attention of other local businesses.

*A very low level of ICT knowledge and use at the outset of the network.*

Some networks have focused their work on the promotion of simple information technology (IT) services backed up by seminars and other support mechanisms in order to address this issue. This approach is focused on serving the needs of local companies, for which simple IT tools (e-mail, Internet sites) have great potential, whilst more advanced ICT (e-commerce) may have more limited scope, depending on the nature of economic activity within the region. In some cases, the networks try to avoid focusing on public sources of revenue, which often seek to promote more advanced ICT tools.

Some other networks face the exact opposite of this problem, when they serve a relatively advanced ICT user group. Consequently, in order to promote ICT use within these groups, the network must provide a high quality of service and a lot of diverse and relevant content. This group is happy to use ICT but the value added nature of the network's services must be high if it is to attract attention, time and commitment.

*Potential members need to be convinced that the network will work to serve their needs and focus on these needs.*

Many networks seek to provide services and training (from very basic ICT onwards) that are relevant to the needs of the membership, but also to put ICT training and services within the context of the economic sector in which the membership is active. This is done through the provision of seminars...
and workshops that are focused on issues within the reference sector but also incorporate ideas as to how ICT can play an important role in these areas.

The reluctance of companies to make the use of ICT central to their work practices.

A frequent solution adopted by networks is to survey their members, looking at their use of IT and specifically at its potential role in the manufacturing process. The survey focuses on members' experiences, the difficulties they face and the role they would like the network and ICT to play in the future. This consensual, informed approach aims to solve this problem through enabling member companies to see the possible benefits of ICT to their company through their own eyes.

2.3. Overcoming barriers to knowledge sharing and collaborative action

Several reports and fieldwork carried out within the framework of the study confirm that firms are often reluctant to exchange information on a continuous and structured basis. They are either unaware of firms with complementary skills or are unwilling to collaborate with their competitors. Indeed, apart from informal links, field surveying has identified very few bottom-up initiatives, with the possible exception of Canadian Québec, where the réseautage is well anchored in the economic culture of the companies.

The main findings of the study are summarised in the following set of questions and answers:

What are the main external and internal barriers for ICT-based cooperation?

The internal barriers include:

- lack of a single point of reference (ICT manager) able to integrate internal and external business communication strategies;
- cultural resistance and managerial insufficiencies;
- lack of suitable in-house dissemination tools;
- training problems.

The external barriers include:

- presence of unfavourable ICT market conditions for SMEs (entry costs, gaps in network infrastructure);
- lack of suitable institutional services for removing technological and economic obstacles to the access and use of new technologies;
- absence of suitable consultancy services at costs SMEs can afford.

How can one gauge the potential for cooperation?

Design an evaluation methodology to establish the extent to which (companies, cooperatives, etc.) are prepared to use ICTs. This could be structured as follows: ex ante evaluation of ICTs via questionnaires; on-site check-ups; drafting of a final report; presentation and discussion of the report with company management.

How can one best present the economic (and other) benefits of clustering?

- Try and demonstrate that the benefits of networking are tangible, for example that it enables goals and results to be achieved that would be impracticable individually (e.g. penetration into international markets, RTD, etc.).
- Although companies are reluctant to share information with each other because they fear losing competitiveness, stress the fact that the relationship between competitiveness and competition may evolve, and that the 'co-opetition' model is a useful one.
- Identify and disseminate successful case histories.
- Disseminate a self-diagnosis mentality and ability.
How can one maximise knowledge sharing within a cluster?

- Combine innovative and traditional tools and approaches (media, seminars, on-site consultancy, etc.).
- Favour direct experience and collect feedback.
- Stimulate the participation of all associates in the selection and production of contents and services.
- Analyse the demand for personalised services.
- Ensure the sustainability of the information flow through innovative low-cost media.
CHAPTER 3: THE IMPORTANCE OF PUBLIC INITIATIVE IN THE NEW ICT-BASED ENVIRONMENT

3.1. A multifaceted rationale

Field surveying shows that public actors are almost always involved in some capacity, for example as content providers, partners or financiers.

In all, 90% of networks receive grants and of this 90%, 45% receive grants from regional governments or the State, one third from local governments, one third from other public organisations (chambers of commerce in particular) and 40% from EU programmes.

Several factors may account for this public sector presence:

- The public sector is probably one of the main information providers: legal and administrative information and data on public spending. The public sector is also frequently in charge of implementing metadata, i.e. information on available information sources, prompting the emergence of a ‘public information service’.
- In many countries, the public sector has a pivotal role in catalysing synergies between the different SME support bodies.
- There is a role for government, perhaps more at the regional and local levels, in fostering greater collaboration between firms themselves, although some caution should be exercised: in fact, collaboration may lead to anti-competitive practices and experience also suggests that government must work with the ‘grain’ of the market and be cautious about trying to create clusters or networks from scratch.
- It has an innovation catalyst function, frequently backed by ad hoc financial support schemes.
- Its association to many initiatives also relates to its role in economic development and spatial planning. Its action also reflects the search for more solidarity, in a context where unequal access to information resources and new ICTs carries the risk of increased disparities and may lead to the emergence of a two-tier information society. It is generally accepted that spontaneous market forces do not ensure optimal use of the territories as the market often ignores external effects and seldom takes the long/very long term into consideration. Public actors can implement counterbalancing policies and thus ensure a fairer business environment for companies through tariffs, equipment strategies and the provision of intangible resources.

3.2. Public relays also undergo re-engineering

Capability and competence clustering to support innovation processes and to capture knowledge in new and existing firms in the area is increasingly encouraged by the intermediary structures that support SMEs, be they public authorities or economic support bodies, such as development agencies, chambers of commerce, etc.

Indeed, several factors lead intermediaries and relays into redefining their role and their intervention methods in the framework of economic development and spatial planning policies:

- The growing belief that it is more efficient to act indirectly at the level of the companies’ environment, trying to create a business environment which is conducive to small business growth, rather than act in the traditional way of direct grants.
- The growing evidence that it is equally important, in addition to the availability and quality of physical infrastructure, to implement intangible infrastructure. This strategic ‘soft’ choice will take advantage of existing competence and the setting-up of an effective network between all the actors to create new added value.
- In this framework, it is more and more widely accepted that the area/sector or country’s economic performance is tightly linked to the ability to access the proper information at the right time. This
means redefining the role of government and public authorities to emphasise the importance of information and expertise, and reviewing and re-engineering small business support policies in the areas of management, labour skills development, trade and marketing, technology and capital for growth.

Of course, the use of ICT by the intermediaries themselves offers new opportunities but also implies an internal (r)evolution in the way they deliver products and services.

3.3. Physical versus virtual proximity: networking the relays

In practical terms, company executives are seen as standing at the crossroads of two proximity patterns: one vertical, deriving from its affiliation to a particular activity sector, the other, horizontal, reflecting its belonging to a local community or region.

The approach is based on the enhancement of the proximity feature, by adding the virtual proximity to the physical proximity.

Both abovementioned affiliation patterns are characterised by existing relays, for example trade associations for the vertical sectoral pattern and chambers of commerce for the horizontal local pattern.

According to their own logic, both types of relays can be encouraged to deliver valuable information to business managers, the former on successful experiences conducted in the same sector but in different towns or regions, the latter using a similar type of information gathered from companies in the vicinity, although not from the same sector.

The key factor is that networking technology suggests that the additional information no longer needs to be stored locally but is going to be delivered via the networks established by the intermediaries.

Moreover, the newly established networks are encouraged to link with similar initiatives, whether sector-based or geography-based, thus favouring intersectoral and interregional cooperation (in the figure).
CHAPTER 4: PARTNERS, NODES AND END-USERS

One of the challenging tasks in analysing business networks is to propose the clearest possible view of network characteristics.

The concept of network suggests the existence of nodes, which interplay in different patterns according to the network structure.

Once the nodes are properly identified, further analysis may be performed.

In this regard, three Canadian researchers have presented a useful synthesis of different inter-firm network structures, according to partner types, nature of partnership and raison d’être of the network.

<table>
<thead>
<tr>
<th>Situation of partners</th>
<th>Characteristics of networks according to nodes</th>
</tr>
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<tbody>
<tr>
<td>Value chain</td>
<td>Horizontal/vertical/diagonal</td>
</tr>
<tr>
<td>Sector of activity</td>
<td>Sectoral/non-sectoral</td>
</tr>
<tr>
<td>Geographical location</td>
<td>Local/regional/provincial</td>
</tr>
<tr>
<td></td>
<td>National/international</td>
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<table>
<thead>
<tr>
<th>Nature of partnership</th>
<th>Characteristics of networks according to links</th>
</tr>
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<tbody>
<tr>
<td>Level of constraints</td>
<td>Formal/informal</td>
</tr>
<tr>
<td>Nature of constraints</td>
<td>Spontaneous/dynamic/stable</td>
</tr>
<tr>
<td>Duration</td>
<td>Structured/flexible</td>
</tr>
<tr>
<td>Degree of flexibility</td>
<td></td>
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<tr>
<th>Reason for the network</th>
<th>Characteristics of networks according to relations</th>
</tr>
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<tbody>
<tr>
<td>Scope of operation</td>
<td>Outside function/inside function</td>
</tr>
<tr>
<td>Schedule</td>
<td>Strategic/tactical</td>
</tr>
<tr>
<td>Goals and objectives</td>
<td>Cooperation/learning</td>
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</tbody>
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<table>
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<tr>
<th>Structure of network</th>
<th>Characteristics of networks according to flows</th>
</tr>
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<tbody>
<tr>
<td>Creation of a new entity</td>
<td>Structural</td>
</tr>
<tr>
<td>Financial participation</td>
<td>Property sharing</td>
</tr>
<tr>
<td>Interaction between partners</td>
<td>Star-shaped/industrial clan</td>
</tr>
<tr>
<td>Empowerment</td>
<td>Hierarchical/heterarchical</td>
</tr>
</tbody>
</table>


However, many networks surveyed within the framework of the study do not lend themselves easily to the above academic classification, in particular because they have not implemented (and most often did not need to) a clear distinction, both conceptual and operational, between entities such as ‘members’, ‘partners’, ‘users’, ‘nodes’, etc.

Accordingly, and in order to present a clearer picture, the approach has been to focus on the last criterion included in the above table, i.e. tracking the information flows.
4.1. Tracking information flows

In-the-field realities demonstrate that multiple definitions of knowledge-based networks (or of the wider notion of business networks) coexist.

Initiatives will tend to call themselves business networks when there are implemented:

- optimal point-to-point channelling of information flow, and/or
- multi-point communication and resource sharing, and/or
- collaborative action.

As indicated above (Section 3.3 ‘Physical versus virtual proximity: networking the relays’), the preferred approach for building a knowledge resource network (KRN) is to encourage relays to share information/knowledge resources, as well as delivery mechanisms (Figure 1).

Each of the relays has in its genetic code the task to deliver added value information and various services to one or more clusters of SMEs around it. New ICTs are enabling technologies which potentially allow for two additional knowledge flows: (i) establishing a bilateral exchange of information between the relay and the SMEs, i.e. feeding directly the shared knowledge base with SME-originated elements; (ii) facilitating collaborative action at cluster level (Figure 2).

Combining the micro and macro levels results in picturing the ‘ultimate’ KRN:

4.2. Retaining looser definitions is probably best

It has been tempting to try and persuade projects encountered during the fieldwork to clarify their network structure by using the toolbox emerging from the study and adopting rather conceptual definitions of nodes, members, etc., but ‘reality resists’.

Within the framework of the study, it rapidly appeared that the modelling exercise had to be combined with an empirical approach, in order to establish a typology of networks, as detailed in the next chapter.
5.1. Summarised methodology

The structure of knowledge resource networks varies according to profession and trade patterns, actor types, cluster-buildings, etc., and, in many cases, they constitute a multidisciplinary kernel upon which the whole intermediary system is built.

Although the main KRN function is clearly knowledge management processes and tools, projects and initiatives often cover two closely associated functions: awareness building and collaborative action — the former as it is a frequent prerequisite, the latter as it represents a natural extension.

One of the objectives of the study has been to support the reference concepts by identifying and describing real examples which would fit into the definition of a KRN.

Thus, the study has been based on operational occurrences of business networks such as centres of excellence, competence centres, science parks, technology institutes, network brokers, federations of associations, local and regional initiatives, clusters, industrial districts, business platforms, etc.

The study team have chosen to carry out the first phase of the study (typology) by taking into consideration a significant number of examples from all over Europe, as there is a minimum statistical threshold of occurrences which must be taken into consideration and analysed in order to reach some level of representation. The second phase, consisting of a series of in-depth analyses, has concentrated on a sample of examples selected in a reduced number of countries:

- three large EU Member States: Germany, France and the United Kingdom;
- one country representing the Nordic part of Europe and which is considered the most advanced country in terms of telecommunications and the information society: Finland;
- one country in an intermediary position, from southern Europe and characterised by a strong industrial tradition: Italy;
- one country belonging to the group of Cohesion Fund countries and considered as 'less favoured' in Europe: Ireland;
- one country from outside Europe: Canada. This country, with a social and economic culture at the confluence of Europe and United States of America, is well advanced in terms of networking of knowledge resources.

Two examples also refer to Switzerland as they are transfrontier.

Thus, 55 examples have been entered into the database for Phase 1 ('Shaping the typology') and 18 examples have been included in the sample used in Phase 2.

The approach adopted within the framework of field research has been to combine the results of statistical analyse with a more empirical approach, based on matching promoter types, strategic objectives and performed actions. It has led to the identification of six main types.
5.2. Six main types emerge

Type A: The ICT disseminator

The main, if not only, aim of these initiatives is to raise the awareness of companies of the importance of ICT as a tool for improved competitiveness and to take appropriate action in order to raise the level of IT literacy and daily practice. ICT training and awareness seminars comprise the basic service, sometimes complemented by an Internet site and/or database design and implementation. In some cases, the ICT disseminator will prompt the development of cooperative ICT projects.

Four occurrences can be identified:

- the generic trainer and/or awareness builder;
- the local/regional trainer and/or awareness builder;
- the sectoral-led trainer and/or awareness builder;
- the ICT projects developer.
**Type B: The local/regional developer**

It is usual for the local/regional developer to have been established prior to the widespread availability of the new ICT tools. Its responsibilities cover economic development, expansion of the job market and local availability of skills. In a nutshell, all the major functions of a development body. ICTs are seen as devices that can help them to better fulfil their mission: new delivery mechanisms; potential for networking practice; and additional services such as the transfer of technological innovation. In most cases, the ICT-based intermediation platform will complement and not replace the existing pattern of action.

Two occurrences have been identified:
- the local or regional area agent;
- the ‘renewed’ industrial district/cluster.

**Type C: The cooperator**

The cooperator sees the potential of new ICTs in developing value from one or more facets of collective action, such as joint research and engineering, integrated supply chain, collective representation of interests, etc. Although the process is expected to be mostly bottom-up, it is also frequently included as one of the objectives of top-down initiatives, when an effort is made to foster networking practice among end-users.

Several occurrences and sub-occurrences can be identified:
- the supply chain integrator:
  - at the initiative of one dominant contractor company,
  - at the initiative of a group of contractors,
  - at the initiative of the suppliers;
- the club of companies;
- the virtual enterprise;
- the national or regional cooperation forum;
- the ‘partnership and networking services’ (between SMEs and/or with a ‘parent’ system of big companies).
**Type D: The marketer**

The marketer is very much Internet-oriented. The primary motive is to exploit the full potential of the Internet as a promotion and marketing tool. It may be considered as the IT-based equivalent of sectoral and/or regional participation in trade fairs and other types of collective exhibits.

Two occurrences have been identified:
- the virtual market place;
- the Internet knowledge database.

**Type E: The science park and innovation centre**

These networks have been initially created in order to:
- favour networking and the transfer of expertise and technologies between universities, research centres and businesses (building an integrated system of scientific and technological research);
- disseminate innovation;
- promote the establishment or growth of high-technology enterprises and new technology-based companies;
- act as an incubator and financier (venture capital).

These types of networks are now integrating the improvement in the utilisation of new technologies by SMEs as one of the key elements of their assignments. Some are now also focusing less on hard infrastructures (laboratories, parks) and more on ‘soft’ infrastructures, i.e. management of intangible assets, becoming ‘virtual technological parks’, etc.

Two occurrences can be identified:
- the business and innovation centre;
- the science and technology park.
**Type F: The one-stop shop**

The promoter of the one-stop shop initiative tries to address the many needs that companies have and to provide the widest possible array of information resources and intermediary services. ‘Big and beautiful’ is the common denominator of initiatives, mostly implemented at regional if not national level. The availability of new ICT has been instrumental in the implementation of these initiatives, based on database management and remote access.

Three occurrences have been identified:

- the network of networks;
- the ‘portal’ (site of sites);
- the regional system.

5.3. Profiling a project against the types

The types are not totally clear-cut and a given project/initiative will have a profile against the various types, one of the types being the dominant type to which the project will be associated, as pictured below.
6.1. The dominant model

At the present time the majority of networks are not self-sustainable, even those who are ‘for the profit-minded’. Many initiatives and projects still see themselves as laboratories and most of them have a general interest mission and should be considered as cost centres. Some of them, in particular the ‘local and regional developer type’, do not envisage sustainability as an issue, as the knowledge resource network is completely embedded in their overall action plan. In the latter case, self-sustainability is more likely to be linked to long-term added value and/or political priorities.

Reflection on financing patterns focuses on the appropriate means of charging for information services and on the possible implementation of membership fees. Moreover, SMEs are used to subsidies and to getting something for nothing from the public authorities or agencies, creating a real challenge for additional revenues for the knowledge resource networks and for sustainability.

In order to be in a position to generate direct revenue, some knowledge resource networks are considering changing legal status, in particular adopting a company status.

In short, it seems improbable that the networks may move in one step towards self-sustainability. There will be intermediate project stages in which more revenue generating activities are gradually introduced, while at the same time reducing the proportional contribution from public funds.

As a side remark, it should also be noted that if self-sustainability was an overriding criterion, networks activities would move more towards the interests of the larger, more successful and technically-competent companies.

There is in fact a need to strike a balance between working with experienced companies and introducing companies with less experience into the networks. This is not necessarily a ‘commercial strategy’, but can be justified, along with continued public support, as part of a regional innovation strategy for example.

6.2. The status of performance assessment as a basic sustainability factor

The majority of knowledge resource networks do not put the evaluation of their performance as a primary concern because:

- they are at the crossroads of public and private sectors:
  - they are mainly targeted at the private sector but involve both private and public organisations;
  - they are mostly funded from public sources;
  - they mix private and public methods and approaches.
- Some outputs are easily quantifiable and scalable but the majority are of a qualitative nature.
- Evaluation of flows/information capital is difficult.
- The majority are recent and have yet to establish a solid, experienced method of measurement. They are only willing to ‘find out’ if there is a need to do so.

Thus, at the moment, self-evaluation is the rule, often based on informal and in-house evaluation tools, using very basic indicators.

Generally speaking, external, more complex evaluation is planned for the future but as of today, the majority of KRN feel that the decision to pursue the initial project into a continuation phase should solely be based upon whether, in the opinion of the end-users, the network is ‘fulfilling a real need’. 
6.3. Practical steps towards performance measurement

Measurement of KRN performance can be based on the following principles.

- They must be evaluated in a dynamic way. Output elements are translated into variables, in order to measure progress. In most cases, interest should have an increased focus on evolution rather than absolute values.
- They must be evaluated in relative terms, according to the specifics of the region or the sector.

However, based on data collected via a ‘first-level’ one-shot questionnaire and stored in a database, the simpler approach will be to compute static profiles against a limited set of variables, as represented in the following graph:

As a second step, more detailed variables can be taken into consideration, resulting in a more complex profile.
But the more comprehensive approach requires the collection of data over time, at network management level and whenever possible at user level.

Three categories of performance indicators can then be distinguished:

- **Capital value**, and in particular in terms of partners’ capital, users’ capital, information capital and management;
- **Usage value**: Internet and extranet/intranet traffic, usage of fora, products and services (information products, events and meetings, consultancy, projects generation, networking services; supply of IT services);
- **Impacts value**: internal and external impact evaluated through data available from the network of partners but also via surveying of end-users.

A well-designed questionnaire will focus on:

- Covering all indicators pertinent to the measurement of project performance, whilst ensuring that data are either readily available or should be accessible with reasonable effort;
- Careful wording of questions so that instant and unambiguous understanding is ensured;
- Combining questions which describe the current status of the network, in order to put its level of progress into perspective, and questions enabling to track evolution between some previous date (last quarter, last year) and the current date.

A list of potentially relevant items appears on the next table.
## Part 1: Capital Value

### A — Partners
1. Partnership patterns
2. Partners involvement
3. Feedback from partners
4. Continuity — new partners

### B — Users
1. Number of users
2. Quality of users
3. Case of a membership system for users

### C — Technicalities
1. Use of Internet tools or software permitting to analyse the quality of the Internet/extranet site
2. Development of specific software (database management, search engine, EDI tools, etc.) for network members

### D — Information and communication
1. Content providers
2. Internet (including extranet)
3. Databases
4. Information retrieval
5. Best practices cases in the catalogue
6. Information products
7. Physical and virtual events

### E — Network management
1. Number of staff
2. Qualification of staff
3. Motivation of staff

## Part 2: Usage Value

### A — Use of electronic communication tools
1. Internet traffic (including Internet and extranet)
2. Extranet usage
3. Forum use
4. Mailing/discussion list

### B — Use of products and services
1. Requests to central nodes
2. Permanent help desk (by e-mail)
3. Physical and Virtual Events (conferences, seminars and training sessions)
4. Advise, consultancy, technical audit
5. Supply of IT services/technicalities
6. Information products
7. Other products and services (tender services and support to gain public funds, technology brokerage, brokerage of partnerships, etc.)

## Part 3: Impact

For this part, some data can be obtained from the partners of the network. However, for a certain number of items, data can be only collected through the surveying of end-users.

### A — Image and credibility of the network
1. Number of external networks/organisations having expressed the wish to establish concrete-operational and valuable links/partnerships with the network at the national scale and at the international scale
2. Number of external visitors having visited the network structure
3. Quotation of the network as a business-led organisation, i.e. a reference/best practice/success story
4. Facility to obtain external funding for current activities or in order to launch new actions (in particular, to find new sponsors)
5. Spontaneous candidatures of qualified people wishing to join the operational network staff

### B — Economic and social impact on a micro level (network structure and the network’s users)
1. Turnover/revenues of the network structure
2. Charging for some products and services
3. Users willingness to pay for information services
4. Requests from users for additional services and new products
5. Direct role of the network in the improvement of the overall competitiveness of the users
6. Direct role of the network in the improvement of users visibility
7. Direct role of the network in the growth of turnover/revenues of users organisations
8. Direct role of the network in the growth of jobs numbers within users organisations
9. Direct role in the improvements in key management areas within the users organisations (planning, marketing, quality, financial management, time savings, etc.)
10. Evolution of cooperative marketing operations within the network
11. Estimate number of partnerships agreements developed thanks to the network
12. Number of development projects developed by the network
13. Number of R & D contracts developed thanks to the network
14. Expansion of network’s area of activities, geographically or at a sectoral level

### C — Economic and social impact on a macro level
1. Direct role of the network in the improvement of the visibility of the region/sector
2. Direct role of the network in the improvement of the attractiveness of the region/sector
3. Direct Role of the network in the ‘sustainability’ of companies (cf. monitoring of average ‘death rate’)
4. Direct role of the network in the establishment of organisations and related jobs in the area/sector
5. Direct role of the network in the creation of new organisations and related jobs in the area/sector
6. Role of the network in the enhancement of the process for IT-standards within the sector

### D — Impact on ICT equipment and usage
1. Direct role of the network in the evolution of the number of companies belonging to the ICT sector in the area (hardware, software, services)
2. Direct role of the network in the number of companies having developed their own website in the area
3. Direct role of the network in the number of companies having developed electronic commerce solutions in the area
CHAPTER 7: THE TYPOLOGY-BASED SURVEY OF SUCCESS FACTORS

7.1. Success factors versus winning strategies

The approach to identifying success factors has combined two sources:

- The views of the KRNs themselves, as reflected in the questionnaires submitted
- The ‘expert’ view of the project team.

Success factors typically cover structural elements, processes and actions (output, products and services). Comments on the structural factors originate more from the experts’ view, while factors linked to actions reflect more the network partners’ (and end-users) opinion.

As a word of caution, it should be stated that the networks’ views rightly relate to the success factors relevant to the fulfilment of their own objectives, whereas the experts’ objective is to derive more general winning strategies for a given type.

Additionally, the distinction should be made between the shorter-term success factors and the longer-term vision of sustainability ingredients, as applied hereafter.

7.2. The ICT disseminator

The shorter-term success factors:

- ‘Reach’, i.e. develop a close working relationship with local bodies at all levels (political, economical and associative).
- ‘Deliver’, i.e. design awareness actions aimed at serving the needs of companies in language they understand: concrete content, provision of case studies of good practices, business focused material.
- ‘Attitude’, i.e. create a friendly, informal atmosphere that is conducive to the exchange of information and know-how.
- Ensure that ICT expertise is widely available in order to enable projects to be executed more effectively or with greater productivity.
- Implement stimulating feedback tools, such as clubs of companies/users chaired by a business manager.
- Gradually shift from centralised awareness to more decentralised actions, using a network of relays.
- Achieve a critical mass in terms of usage and number of firms.
- Insofar as is possible, maintain free access to a substantial part of the services provided.

The longer-term success and sustainability factors:

- Progressively less and less companies will need to be introduced to the benefits of ICT or e-commerce. Consequently, many networks will have to enhance their ICT dissemination role by introducing highly specialised and more themed content. In order that companies, already aware of e-business advantages, continue to use the networks’ resources, it will be necessary for them to shift from being simply a disseminator to a wider-ranging provider of added-value services.
- Another challenge will be to ensure that the network’s intermediaries, at the more decentralised level, have the skills and resources to support the users they serve. Thus, many ICT disseminators will have to transfer their knowledge towards these intermediaries so that all the nodes of the network act as relays and provide the highest standard of service to a growing number of users. In that sense, they will have to act more as a network manager and intermediary between suppliers and users of information and services.
7.3. The local/regional developer

The shorter-term success factors:

- Establish a strong partnership; bringing together all relevant institutional, economic, technical, educational and training partners.
- Fight resistance often met at the level of traditional actors within local authorities and professional associations, and overcome the difficulty of involving them in quick ICT-driven management processes.
- Avoid duplication with the activities and projects of each actor from the network.
- Establish direct relationships with end-users. In this regard, it appears to be easier, for example, for the renewed industrial districts than for the others to be perceived as ‘business-oriented’/focused on end-users’ needs.
- Succeed in providing quality low-cost services without being criticised by the private sector on the grounds of ‘unfair competition’.
- Cooperate with ICT pioneers in the region.
- Keep a focus on the specifics of regional/local industrial sectors.
- Provide integrated business information (market and technological watch) coming from several information sources.
- Simplify access to innovation.
- Possibly implement advanced ICT platforms for tele-training and/or videoconferencing.

The longer-term success and sustainability factors:

- Find the best compromise between the public service and general interest missions and the search for profitability, efficiency and financial sustainability. Bridge the potential gap between the non-profit profile and the delivery of added-value services.
- Anticipate the future of public action in favour of economic development and the evolving role of professional associations.

7.4. The cooperator

The shorter-term success factors:

- Establish a strong initial group of companies actively motivated and involved.
- Be seen as business-led, practical, well-focused, relevant and matching the real needs of companies.
- Implement a networking methodology, giving the opportunity to develop both formal and informal meetings, links and exchanges.
- Remember that many companies think that to be a locally based network is a success factor upon the condition that it gives an access to regional, interregional, national and international networks.
- Develop an ‘open door’ approach, i.e. not limited to companies but open to other actors and intermediaries, including private–public partnerships.
- Ensure that the intermediary, when it does exist, acts as an independent, neutral and not-for-profit networking agent.
- Outsource processes and tasks whenever necessary.

The longer-term success and sustainability factors:

- Accept benchmarking, including the identification and demonstration of best practices and results that are valuable and transferable.
- Implement cooperative thinking and long-term economic strategies between enterprises.
7.5. The marketer

The shorter-term success factors:

- Involve important actors and institutions of the sector. Recognise the credibility factor of the sponsors and promoters or host organisation.
- Involve users closely during the development phase of services.
- Draw upon a large number of relevant and topical information sources.
- Implement a highly organised system for producing and updating material, and ensure added value through revision of information by editors and experts.
- Recognise the importance of the quality of the technological platform (often a proprietary high speed network) and the marketing approach (the layout of the user interface, the guiding structure and the retrieval tools).
- Develop full on-line services in order to provide customers with an easy solution gaining a web presence and visibility.
- Achieve a critical mass (hence the necessity in many cases to launch free services).
- Accept the importance of performance monitoring.

The longer-term success and sustainability factors:

- Master fast expansion, as the information might become too diversified and thus possibly overlooked by users. On the one hand this issue addresses the technical implementation of the services, i.e. the layout of the user interface, the navigation structure and the retrieval tools. On the other hand, it may become more difficult in the long run to keep a distinct profile that can be explained and ‘sold’ to the target groups, to potential new content providers or financing partners.
- Overcome the problem of on-line services having started with strong public support and free of charge: these networks now recognise the potential obstacle of persuading companies to pay for something that, so far, they have been able to access without payment.
- Permanently integrate additional content providers and user groups.
- Manage internationalisation, and in particular the multilingualism issue.
- Recognise the fact that the level of income and, therefore, the rate of further development, depends on effective marketing, and careful attention paid to the pricing of services.

7.6. The science park and innovation centre

The shorter-term success factors:

- Recognise the importance of the partnership structure (no missing links, critical mass of competences, adequate balance between business and research).
- Favour a ‘soft network’ profile in order to avoid competitive issues between members, in particular in the high tech sector.
- Prepare a ‘strengths and weaknesses, opportunities and threats’ (SWOT) analysis.
- Provide an international dimension and target for international recognition.
- Operate in a well-defined cluster/industry and pay attention to local specifics.
- Mix general (quality, patents, socioeconomic trends, export, finance, human resources, etc.) and technology-oriented information resources and services.
- Enhance cross-fertilisation between sectors, as innovation in one sector may cross-fertilise another sector (e.g. biotechnology and agro-food).

The longer-term success and sustainability factors:

- Overcome security and IPR issues, a frequent obstacle to extranet usage.
• Overcome obstacles to business creation and enterprise-research cooperation arising from the legal framework on innovation (financial and tax issues in particular).

• Reinforce the involvement of each member within the network, often at stake in case of ‘strong’ partners.

7.7. The one-stop shop

The shorter-term success factors:

• Implement a ‘knowledge infrastructure’, i.e. meet the challenge of coordinating all actors and information sources, building on the asset that in most cases the network is promoted and managed by the administration (national or regional) which has the credibility, power and legitimacy.

• Build a coherent network of networks with adequate involvement and awareness of intermediate links, i.e. succeed in establishing a network highly decentralised from a content perspective and centralised from a coordination point of view.

• Commit senior management within the network promoter, beyond the task force in charge.

• Develop internal skills in knowledge management and publishing.

• Check the quality of business information (reliable, up to date, covering all issues).

• Recognise the need for quality and efficiency of the information system and technological platform, quality of search engines and profiling tools, quality of navigation tools.

The longer-term success and sustainability factors:

• Evolve from an information delivery channel to an interactive communication tool: develop on-line interaction with business clients; develop e-commerce and transactional models.