ESPON

EUROPEAN SPATIAL PLANNING OBSERVATION NETWORK

ESPON project 1.2.3

Identification of Spatially Relevant Aspects of the Information Society

First Interim Report
October 2005

Co-financed by the European Community through the Interreg III ESPON Programme

This report represents the interim results of a research project conducted within the framework of the ESPON 2000-2006 programme, partly financed through the INTERREG programme.

The partnership behind the ESPON programme consists of the EU Commission and the Member States of the EU25, plus Norway and Switzerland. Each partner is represented in the ESPON Monitoring Committee.

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Warsaw University, Centre for European Regional and Local Studies (EUROREG)
October 2005

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Foreword

This is the first interim report of ESPON Project 1.2.3 "Identification of Spatially Relevant Aspects of the Information Society". The project started officially on June 27, 2005.
The Information Society is the new phenomenon influencing regional development within Europe. The understanding of IS impacts on spatial processes is crucial when formulating adequate policy recommendations. Thus the project aims at integrated analysis of both IS components: technological and socio-economical in order to understand the territorial aspects of the Information Society and assess whether the ICTs and initiatives on Information Society are making space more coherent and promoting a balanced and sustainable development of the territory of the EU or are exacerbating disparities between regions, both inside and across countries.
The project is expected to define concepts and to find appropriate territorial indicators, typologies and instruments as well as methodologies to identify trends with special reference to regions concerning the development of the information society and taking into account typologies developed by other ESPON projects (on polycentrism, urban-rural relationship, transport trends and R&D impact).

As ESPON project 1.2.3 belongs to the first strand of the ESPON projects, covering thematic issues of major spatial developments, it holds an important position for the elaboration of the whole programme by contributing to the preparation of the common ground for the investigation of information society related themes in relation to the spatial structure in Europe. Among other new launched projects and due to the role of the IS in the context of the Lisbon Strategy, ESPON project 1.2.3 can be expected to serve as a strong scientific basis for the propositions of the Commission in view of the reform of post-2007 Structural Funds.

To achieve such ambitious objectives, the findings of the project will be based on literature analyses, statistical comparisons and empirical studies. They will have a more general meaning for a broader context of the European spatial and cohesion policies, as well as for the national and regional development policies in the member states of the EU. The methodology applied in the project will fulfil all the requirements referring to the indicators collected, data analysis, and references to earlier ESPON projects of special relevance to the current project.

The presented report is the result of joined effort of the all project partners under the leadership of Warsaw University, EUROREG.

The transnational project group (TPG) is composed of seven scientific institutions from different European countries. These institutions are listed below in alphabetic order by country of origin.

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The ESPON Programme was launched after the preparation of the European Spatial Development Perspective (ESDP), adopted by the Ministers responsible for Spatial Planning of the EU in May 1999 in Potsdam (Germany) calling for a better balanced and polycentric development of the European territory. The programme is implemented in the framework of the Community Initiative INTERREG III. Under the overall control of Luxembourg, the EU Member States have elaborated a joint application with the title "The ESPON 2006 Programme – Research on the Spatial Development of an Enlarging European Union". The European Commission adopted the programme on 3 June 2002.

See http://www.espon.lu for more details.

The views expressed in this report do not necessarily reflect the opinion of the ESPON Monitoring Committee.

Table of contents

Figures

Tables

1 Introduction

1.1 Thematic scope and context

The Information Society (IS) definition in literature and in official documents of the European Union is not explicitly formulated. On one hand the IS is described as a telecommunication society, from the other as a learning, innovative and creative society. Therefore the descriptions of the spatial impact of IS is determinated by the adopted approach (Cornford, J., Gillespie A., Richardson R., 1999).

However, regardless of the diversity of definition we are certainly witnesses of important shifts in the global economy – from an industrial towards a knowledge-based or information economy. The recent observations and the wide range of literature indicate that one of the main characteristics of the modern world is the growing significance of knowledge and information in determining economic performance, which leads to a new economic paradigm where innovation processes play a fundamental role (Toffler A., 1997; Drucker P.F., 1999; Thurow L., 1999; Naisbitt J., 1997; Dunning J.H., 2000) simultaneously inducing new modes of knowledge production (Kujath H., 2005).

Against this background we can identify and describe several spatial trends observed in Europe. These are as follows:

1. In the knowledge-based economy (K-BE) paradigm the ability to create innovations and participate in multi-level networks have become the source of stable competitive advantage (Lundvall B.A, Johnson B., 1994). Those regions in which competitive, innovative firms are concentrated do attract new investment and are able to improve their technical and institutional infrastructure, as well as to offer good living conditions for the "world class" (Kanter R.M., 1995). The territories less accessible, with obsolete social and economic structures, are lacking these advantages and have to rely on competing with costs of production.
2. Therefore, the chances for such backward regions seem to be even smaller in the knowledge-driven economy than it had been the case in the previous model of industry-based growth (Malecki E.J., 1997; Gorzelak G., Jałowiecki B, 2000). Two factors seem most responsible for this change: the growing role of the transnational companies, at the expense of the interventionism of the state, and the growing importance of the "innovative milieu" for innovation-driven businesses (Castells M., Hall P., 1994; Camagni R., 1999).

3. The last observation is strengthened by the fact that - as research proves (M. Castells, Oxford 2001) - the concentration of companies working within and for the Internet are even more concentrated spatially than the companies of other sectors. The expectations that the internet will allow for a more even spread of economic activities have not materialised. With the exception of computing- and call-centres (which, however, concentrate mostly skilled "digital-workers", and not the highest professionals), most of Internet-related services are concentrated in big cities – i.e. where the customers of internet-providers are located. Consequently, metropolitan areas, in this context, are nodes of intra- and interregional networks of knowledge production (Schmidt, S., 2005).
4. Thus, in general, the metropolitan areas (identified within ESPON program as MEGAs – Metropolitan European Growth Areas) are the regions best prepared to develop the information and communication technologies and take advantage of the virtues of the knowledge-based economy and the information society (IS) (Gawlikowska-Hueckel K., 2003). However, according to the current experience, there is evidence that there are cases in which these areas seem to cut the ties with their regional hinterlands and with the more distant peripheral regions, and tend to increase the exchange within the global metropolitan network (Gorzelak G., Smętkowski M., 2005). Thus, the least advanced regions loose relative distance to the ones better endowed with the assets and skills needed for the K-BE and the development of the IS.
5. Given the actual almost saturation level of ICT – like the cellular phone and Internet - in most regions of Europe, the qualitative dimension of the use rather than the quantitative level of adopting these technologies is an important factor which influences the impact of the ICT on economic development. The business use of the Internet varies strongly across European countries and regions (ESPON 1.2.2 Final Report), as well as the spread of e-administration, e-education and e-culture. In the higher developed and technologically more advanced countries the use of the ICT is more profound and shapes the socio-economic process in a deeper way than this in poorer countries and regions, where the ICT is more used on the "consumption" (personal communication, passive use of internet for entertainment and communication) rather than on the "creation" side.
6. The national policies of the member states vary strongly with respect to IS implementation (including i.e.: ICT development, technology promotion and innovation support). Several countries have long ago

recognised the importance of the wide and development-related use of ICT as a factor supporting their development and increasing their competitiveness due to greater technological and innovative potential. Some other seem to be delayed in this respect, and their activities rely more in programming than in real actions. Similar differences may be found in the policies introduced by particular regional authorities (Dabinett G., 2001; *The Structural Funds …,* 2001).

7. It may be stated that the many members of the EU would rather resemble the second group of countries – which are more active in programming the accelerated creation of the knowledge-based economy and information society rather than being involved in real activities and actions.
8. The Lisbon Agenda (*eEurope, 2000*), although promising and challenging, has in fact be implemented at a very slow, unsatisfactory pace, and has had a much weaker effects on the EU on the whole and its member states than the national polices of the most advanced countries within the EU. The promising revision of the Lisbon Agenda is still to be implemented.

1.2 General objectives

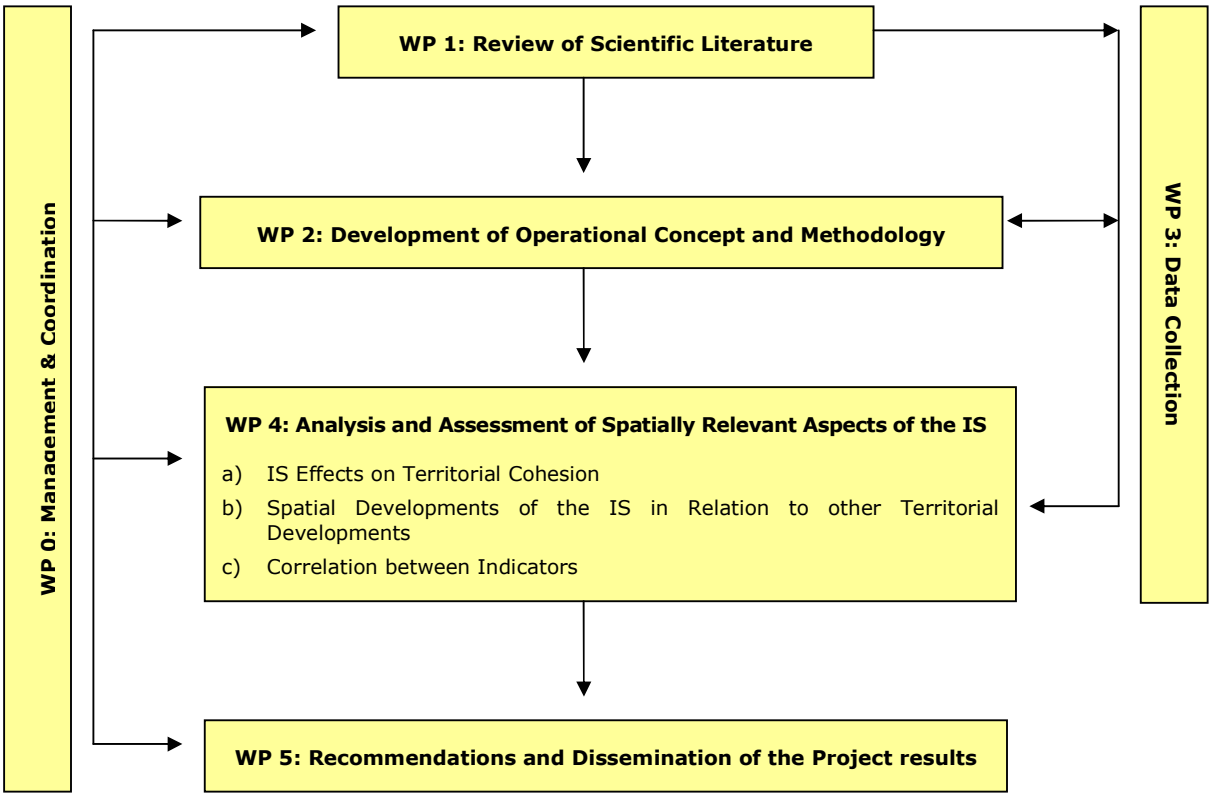
The research project basically focuses on the following objectives:

1. Analysis of the Information Society from a territorial perspective – identification of information society's state and trends, typology of spatial units form the perspective of the level of development of information society, relations between traditional regional competitiveness indicators and indicators specific for information society;
2. Analysis of the Information Society's territorial aspects at macro-, meso- and micro-levels – effects of the information society on spatial development in different types of regions, relocation of economic activities in relation to changing transport patterns.
3. Formulation of policy recommendations for macro-, meso- and micro-levels – identification of possible policy initiatives supporting cohesion in terms of ICT availability and use and in accordance with the most recent understanding of Cohesion Policy (Communication from the Commission, 05.07.2005).

1.3 Project structure

In order to obtain a clear and streamlined structure of the project, the tasks presented in the Terms of Reference and the award criteria in the restricted call for tender have been grouped into work packages.

Figure 1 Graphical presentation of the project's components



The first interim report contains mainly the results of WP1 on scientific literature review, WP 2 on the methodology and concept of the IS, as well as partly the WP3 on data collection.

1.4 Project management and coordination

The kick-off project meeting of ESPON project 1.2.3 was held in September 2005 in Warsaw. The project's philosophy, content and methodology as well as content related division of tasks between partners have been discussed. Besides issues related to the project's organisation, contracting and financial reporting have been clarified in

order to ensure a smooth and successful running of the project from the beginning.

Due to the relative short time period of ESPON project 1.2.3 (June 2005-May 2006) the TPG faces a tight time schedule, which requires strong project management and coordination. Research and analysis in the context of work packages will run parallel to each other, thus a close communication, clear division of responsibilities and tasks will be needed. For several working steps this will be organised by elaboration of templates and guidelines by the work package responsible (EUROREG/IRS/UJOE). These will serve as common basis of analysis conducted by all partners (e.g. template for data collection, guidelines for national parts of the case studies, surveys to be used in the regional parts of the case studies).

The Subsidy contract between ESPON Monitoring Authority and Warsaw University EUROREG (Lead Partner) was signed on 6th October 2005. The partnership agreements between all Project Partners and the Lead Partner were signed till the end of October.

2 Review of scientific literature and relevant research focused on existing IS definitions, relevant indicators and IS spatially relevant aspects (WP1)

2.1 Scientific literature

2.1.1 Definitions of information society

While the Internet was first conceptualized in 1974 as a "network of networks", the building blocks for its exponential growth were not fully in place before 1995 (Leiner B.M., Vinton G., Cerf V.G.,…, 1980, p. 65-75). We are currently living in a transition period that can, notwithstanding all terminological and contextual debates, be called "the information society" (Webster S., 1995, Castells M., Oxford, vol. 1, 1996, Lacroix J., Tremblay G., 1997, p. 1-154).

The information society has increasingly begun to attract interest from the civil society point of view in addition to market needs. Control over one's own life within the information society calls for emphasising an ability to communicate and interact with others using new tools and modes of operation differently from that required in an industrial society (European Commission, Living and working…, 1996).

The 'Information Society' has been characterized by: (1) ease of information access, (2) interaction richness, and (3) low interaction and information costs (Kim B., Barua A., 2002, p. 215-231). The concept of the information society is the product of the convergence of several distinct forces in the 1990s (Loebbecke C., Wareham J., 2003, p. 165-182).

The information society can be regarded as a key word of the future at the present and it has become an object of both theoretical discussion and pragmatic programmes (Vipera M. L., Nurmela J., 2001, p. 245-265). The information society is seen to manifest itself in a variety of ways: in networks, in the economy, in technology, in expertise, content and action, in internationalisation and in the very idea of postmodernism. It comes natural to assume that essential discontinuity, radical change exists between the present and future. Enterprises are commonly perceived as the most important actors in the information society, whereas governments seem to be losing their importance, and to remain merely as a guarantor of the conditions under which international businesses operate.

The substructure of the Information Society is the generalised use of low cost and accessible data and information, its gathering, storage,

manipulation and retrieval and its later purposive use in the form of knowledge to improve the quality of life of citizens via the provision of products and services HMSO (HMSO, Modernising Government, 1999, Cmnd. 4310).

These improvements may take the form of new ways of consultation by decision-takers (tele-democracy), support new ways of working and new products (e-services) and/or digital methods of search, assessment and transacting purchases (e-commerce). Digital inter or intra-relationships emerging in the Information Society are business-to-business or public administration to public administration (B2B or PA2PA), organisation to customer/citizen (B2C or PA2C), or cross-institutional relations (for example, B2PA or PA2B). Public administration (PA) here means statutory-based, publicly owned and funded service providers with a local remit. Tele-working here is employed as an overarching term covering tele-democracy, e-commerce and e-services (Kinder T., 2002, p. 329-355).

This definition of tele-working to include e-commerce is an alternative approach to that of extending the definition of e-commerce to include a wide range of non-transactional communicative interactions.

As many theorists have formulated, through different terms and varying concepts (Bell D., 1973, Gershuny J. I., 1978, Masuda Y., 1983, Druckner P.F., 1993, Stonier T., 1983), societal development in advanced industrial countries has led toward an information society, where the major driving forces are the development of information and communication technology, the rapidly increasing use of new devices, and the growth of the specific service sector (Ahlqvist T., 2005, p. 501-519). According to Castells (Castells M., Oxford 1996), the crucial technological turning point was the invention of microchips in the early 1970s. Since then, the core of information society was seen as consisting of technologies of information processing and communication - the logic of information technology was the basis of information society. Information and knowledge were simultaneously pivotal as production factors and as products. Thence, not just the role of information per se, but also its self-cumulativeness, productiveness, and creativity were central technological dimensions of information society (Ahlqvist T., 2005)

The driving force of information society has primarily been resting on technology as a physical thing. The development has emphasized, for example, the growing efficiency of computers and more efficient network connections (Ahlqvist T., 2005). Mannermaa argues that information

society includes both agricultural and industrial societies (Mannermaa M, 2003).

Contrary to a rather restrictive concept based on the characteristics of information and communication technologies, Castells (Castells M., Oxford 1996) emphasizes the accumulation of information and the societal effects of information technology. Information society is more than an expression of technological determinism (Grantham A., Tsekouras G., 2005). It encapsulates shifting power relations and organisational and cultural change. For this reason Castells uses the term *network society* (Castells M., Oxford 2002, p. 507, Stehr N., 2000, p. 83-94).

Building on Lundvall and Johnson's (Lundvall B.A., Johnson B., 1994, p. 23-42) learning economy, Conceic¸a˜o et al. (Conceic P., Heitor M.V., Lundvall B.A., 2003, in press) discuss the learning society in terms of innovation and competence building with social cohesion. They view innovation as the key process that characterizes a knowledge economy understood from a dynamic perspective, while competence is the foundation from which innovation emerges and which allows many innovations to be enjoyed.

Interestingly, ICT, when used as a broad tool for amalgamating local knowledge incubated by the communities with information existing in remote databases and in public domain, heralds the formation of a new class of society or the Knowledge Society. Knowledge thereby becomes the fundamental resource for all economic and developmental activities.

2.1.2 The measurement of the information society

Internet grews from a 313,000 hosts in 1990 to 43,230,000 hosts in 2000, with an estimated 110 million hosts is 2001 (Samuelson P., Varian H., Berkeley 18.07.2001). Moreover, the information technology sector constitutes an ever growing percentage of the US economy, indicating a growth in the significance and frequency of the product use in society. For example, by the year 2000, exports of IT products accounted for 29% of all US exports (Mark R., New York Times, 29.03.2000). In addition, information based products such as television, motion pictures and printed media constituted between 50 and 80 billion dollars in of the domestic US economy in 2000 (Bureau of Economic Analysis, Industry Accounts Data: Gross, Domestic Product by Industry, http://www.bea.doc.gov/bea/dn2/gpoc.htm , November 2001).

Table 1 The 10 most advanced IT countries by The IDC/World Times Information Imperative Index*

Country	Social infrastructure[a]	Information infrastructure[a]	Computer infrastructure[a]	Total index
USA	544 (2)	2010 (1)	2433 (1)	4987
Finland	536 (3)	938 (13)	2117 (2)	3591
Sweden	492 (9)	1235 (5)	1722 (7)	3442
Denmark	492 (8)	1280 (4)	1668 (8)	3440
Norway	518 (5)	1057 (9)	1848 (4)	3423
Canada	573 (1)	1135 (8)	1611 (10)	3319
Netherlands	493 (7)	1193 (7)	1613 (9)	3299
Switzerland	463 (13)	1021 (11)	1789 (6)	3273
New Zealand	526 (4)	1289 (3)	1434 (12)	3249
United Kingdom	461 (15)	1212 (6)	1571 (11)	3244

*the position of the country on each subindex is in parentheses

Souce: http://www.idcresearch.com/iirev3.htm.

2.1.3 Factors leading to emergence and development of the information society

Conceptually, the factors leading to emergence and development of the IS include: rapid technological advances in the information technology sector; the widespread recognition that computers can be used to communicate information, not merely process it; the spread of simple, inexpensive and powerful computer networks; and an economic climate with risk tolerant capital willing to finance venture capital investments into technology based upstart companies.

Other authors mention the following components: (1) the diffusion of personal computers to businesses, universities, and homeowners; (2) local area networks made cheaply available by the commoditization of Ethernet technology; (3) the maturation of the standards used to connect disparate communications networks, permitting address assignment, email messaging and file transfers; and (4) the availability of browser technologies that enabled a common, easy to use interface via hypertext markup language.

2.1.4 The societal impact of the information technologies

The evolution to the Information Society – the rise of electronic networking, office automation or computerization of service delivery – offers a breeding-ground for the development of completely new business concepts. Since the Bangemann report, "Europe and the Global

Information Society" (Bangemann et al., 1994), the notion of information society means - at least in Europe - a modern society with its economic and cultural life crucially dependent on information and communication technology, that is on computer techniques, on communication hardware and software and the already global network. To elucidate, the information society is going to be an InfoTech-addicted global society characterized by increasing intellectual activity (Szántó B., 2005, p. 469-476).

Another distinction of this kind of society is its quality of 'co-operative competition'. The information society is a highly competitive yet democratic society with unfolding mass education and cultivated individual self-development to meet the needs of intensified innovation. According to the Bangemann report, the primary goal of the European Union is to become the leading information society in the world, creating the framework to which others will have to join and adapt themselves. The information society must not only provide quick and efficient access to information - albeit such access still leaves a lot to be desired - rather it must succeed in competition over technology, using innovation to gain technological and consequently economic advantage.

Although the social effect of innovation is usually measured by the percentage of its contribution to the GDP - over and above the capital and labour effect, it was around 40% in the 1960s and close to 70% at the end of millennium – it should be emphasised that innovation as a process first of all increases man's problem-setting and problem solving abilities, and only secondly, as a result of this the wealth and stability of the society increases. The phenomenon of innovation is therefore extremely important for our society, essentially because of our intellectual evolution affiliated with the processes of human cognition.

The information society can - on a not-so-sophisticated daily basis - be associated with computers, with the technology of rapid data transfer and its global impact. On the other hand, with InfoTech spreading and becoming increasingly effective we have undoubtedly become devoted to a tool, which is able to democratise the whole world of social functioning. We have also become the entities of the global economy and -to some extent – of a global society, which would not have been possible had not the innovation in information techniques and technology occurred.

2.1.5 The complex nature of an information society

The development of technology has been shifting toward the social notion, toward the primacy of content and communicative applications (Negroponte, N., 2003). In the pioneer countries of information society, for example, the United States and Nordic countries, the content applications have been growing in importance as the primus motor of technological development. This reflects the changing demands of consumers. For example, the decision to buy a mobile phone is increasingly dependent on the services provided, not on the mere hardware. Furthermore, the notions of maximum (im)mobility and universal connectivity will also have crucial impacts on the future of information and communication technology (Ahlqvist T., 2005).

However, information society complicates the picture by adding many emergent features such as the increase in the forms and sheer amount of information and the rise in the level of sociotechnical interlinkages (Schienstock D., Hämäläinen T., 2001). Following this argument, it can be stated that information society will be more complex than earlier societies because of these emerging new features.

2.1.6 The changing nature of the process of competition

A firm or a region competes on the basis of what they have which is unique in relation to their competitors. Thus, the competitiveness of a region rests on the capability to continuously innovate and diversify its product range rather than in producing the same products at a lower cost than the competitors.

Drawing upon the work of Joseph Schumpeter, learning economy theorists argue that the most significant form of competition is 'quality' rather than price-based competition, especially within an economic environment where the rate of innovation is high (Morgan K., 1997, p. 491-504, Todtling F., 1994).

Innovation is increasingly seen as a way for firms, regions and nations to gain competitiveness in the face of globalization because it enhances the learning abilities of firms and workers (Lundvall and Borras, 1997);

For Morgan, all this interest in innovation has stimulated a debate around the character of contemporary capitalism "where knowledge is the most strategic resource and learning the most important process" (Lundvall, 1994, EAEPE Conference, October, Copenhagen; in ibid).

Maskell (Maskell, P., 1999, p. 113) argues, ‘‘a knowledge-based economy is materializing, where the competitive edge of many firms has shifted from static price competition towards dynamic improvement, favoring those who can create knowledge faster than their competitors’’.

In a knowledge economy the competitiveness of the firms is determined by the quality of the products and processes, the decrease of decision, production and delivery times of new products, the adoption of technological and organizational innovation in production processes. Thus, it is crucial to develop the competencies and professional skills of the labour force, the intermediate and top managers. In particular, the factors which determine the survival and success of firms are increasingly less the fixed investment and the financial resources and more the know-how, the intangible resources and the distinctive competencies.

It should be also indicated that the ability to create innovation is a condition for achieving a stable competitive advantage. Innovation creates demand for itself, and therefore this, who can be innovative (firms, countries, territorial units hosting innovative companies) can belong to the high segment of the global economy, where not the cost of production but is novelty is a main factor determining the competitiveness of a given product.

2.1.7 Four different frameworks in the process of knowledge creation

Learning is seen as a key element for the long-term advantage (Teece D. et al., 1997, p. 509-533; Kylaheiko K., 1998, p. 319-332). In the same way, as knowledge is nationally embedded due to sectoral specialisations as well as political and cultural organisations and institutions, knowledge is also regionally embedded as a result of a historically produced territorial division of labour.

In a methodological perspective, there are different frameworks, within which knowledge may be created and analyzed. These are:

- the individual firm, where different workers, managers and entrepreneurs interact,
- the sector or the market where different firms interact through relations of monetary exchanges, increasingly within an international perspective,
- the institutions, where various private and pubic collective actors (stakeholders) interact in the framework of political relations and

aim to modify public norms and regulations, mainly within a national perspective,

- the regions or the territory, where also in a formal and informal way actors belonging to different sectors and having a different institutional nature interact, within the framework of complex regional innovation systems, and adapt their behaviour and strategies.

2.1.8 A wider concept of knowledge

Whereas information is that part of knowledge that can be easily partitioned and transmitted either through computer networks or in written form, knowledge itself is a much wider concept. Knowledge is often defined as organized information, and information as organized data. Knowledge is a human practice rather than a thing that resides in artifacts. Knowledge may be shared between people, but this involves a process of learning and experience about each other's knowledge. Sometimes this knowledge sharing can be carried out in order to exchange information. But the goal is to render information useful. It is for these reasons that (a) much work is being carried out currently at the OECD and elsewhere in order to improve our understanding of these processes of interaction, and (b) why we tend to differentiate between differing types of knowledge. Thus, codified knowledge and tacit knowledge differ importantly in that the former can be written down (in a patent, drawing, design, formula, etc., and transmitted) while the latter is skill-based, talent-based and experiential. Therefore tacit knowledge is difficult to transfer except through demonstration (learning by doing) or appropriation (hiring the person who has a talent or the experience you want).

Knowledge has to do with the outcome of learning. Learning gives rise to know-how, skills and competencies which are often tacit rather than explicit and which cannot easily be transmitted through telecommunication networks. (Lundvall, 1998, p. 34.)

Following Hayek (1948) and Polanyi (1958), scholars working in the tradition of Austrian economists have pointed out that if a good deal of knowledge, such as the price of gold, can be easily codified and transmitted, much important knowledge is tacit and dependent on the "particular circumstances of time and place," and therefore cannot be acquired by traditional market research procedures or transmitted by advertising or long-distance learning.

In fact, "humans (and other living creatures) 'know things' that they have not acquired as 'information' and which, not having been reduced to symbolic representations (code) are held in forms that are not readily available for communication to others (at least not explicitly as 'information-bearing' messages)". Which simply means that humans have a knowledge of things which is tacit (Among the numerous contributions discussing the tacit aspect of knowledge see: Dosi (1988), Senker (1995), Lundvall (1996), and Cowan and Foray (1997).

The main traits of tacit knowledge are that it is difficult to communicate and that it is embedded in the person or in the community. Tacit and explicit knowledge are not fully separate forms of knowledge, but mutual, complementary units.

Because knowledge is not simply data or information, but is rooted in human experience and social context, its management demands that close attention is paid to the people and culture as well as to organizational structure, and information technology (Havens and Knapp, 1999, 4-9).

2.1.9 The collective nature of knowledge

The key to innovation is people who own the means of innovation - their knowledge - and that they are independent and mobile. Organizations in the knowledge economy are in constant competition for this critical resource. To attract and hold them, companies need to organize themselves to be the place where they feel most appreciated.

Traditionally, knowledge is seen as something belonging to the individual. Individual knowledge is the knowledge each individual has or masters, acquired through education and experience. But this is not all the knowledge an enterprise runs by. Knowledge is also collective (March and Simon, 1958; Nelson and Winter, 1982).

Ducatel's points that organisational learning is a social process and skill development `does not take place at the individual level but amongst groups [which is] a fact that many training programme[s] still seem to ignore (Ducatel, 1998, p. 19).

The problem here is clear, if knowledge remains private, it can inform private action but not social action. For social action to be possible and for actions to be mutually supporting and collaborative it is necessary that private knowledge becomes public understanding to the requisite degree. The transmission of private knowledge into shared understanding

is a socially distributed process and this process must depend on institutions for the sharing and common interpretation of flows of information (Metcalfe J.S., Ramlogan R., 2005).

The intangible or tacit nature of this form of knowledge means that its circulation is highly social and cultural, so that ``tacit knowledge is collective in nature and, because it is wedded to its human and social context, it is more territorially specific than is generally thought'' (Morgan K., 1995, p. 8; Lundvall, 1988).

2.1.10 The combinative nature of the process of knowledge creation

As a consequence of the importance of know-how it is the network or organised market governance structure (see Powell, 1990, p. 295-336) that is perceived to best support trust facilitated interactive innovation (Lundvall B.A. and Johnson B., 1994; Morgan K., 1995, 1997; Cooke P. and Morgan K., 1993, p. 543-564).

No less an authority than Adam Smith laid the foundations for our discussion when he suggested that the most fundamental aspect of the division of labour is the division of knowledge, and the consequential existence of roundabout and combinatorial ways of producing knowledge (Metcalfe J.S., Ramlogan R., 2005).

The importance of collaborative linkages has been commented on by several scholars in recent years (see OECD, 1992, chapter 3, for a review). Pavitt (Pavitt, 1991) showed that one of the reasons large firms engage in basic research was as a way of making links with experts in other institutions to improve their innovative potential. Thus, innovation is the 'craft of combination', revolving around the combination of various types of knowledge (Lundvall B.A., Johnson B., 1994, p. 23-42).

2.1.11 A wider sectoral scope than the so called high-tech sectors

The concept of the knowledge economy has been linked by some to a new IT driven techno-economic paradigm (see, for example, Freeman and Perez, 1988). However, the learning economy is not necessarily a high-tech economy.

According to Lundvall and Borras `the learning potential ... may differ between sectors and technologies but in all sectors there will be niches where the potential for learning is high' (Lundvall and Borras s, 1998, p. 35). Maskell (Maskell, 1996), showed that, in Denmark, learning also

took place in traditional low technology sectors, and this still led to growth.

The concept of the "learning economy" means an extension of the range of branches, firm-sizes and regions that can be viewed as innovative, also to include traditional, non R&D intensive branches (e.g. the importance of design in making furniture manufactures competitive and moving them up the value-added chain).

Furthermore, knowledge flows within a distributed knowledge base (Smith K., DRIUD Summer Conference, Aalborg, June 2000), which more and more substitutes intra-firm (or intramural) knowledge bases (which constitutes the basis for the OECD taxonomy of R&D intensity), taking place between industries with very different degrees of R&D intensity, further weaken the distinction between high-tech and low-tech industries. (e.g. when food and beverage firms produce functional food based on inputs from bio-tech firms).

Thus, the development in the European countries toward the model of the knowledge economy can not be reduced to the development of new high-tech sectors or R&D intensive sectors. Moreover, R&D investments should be integrated by policies which deal with other crucial dimensions of the innovation process. In fact, the new knowledge economy is different from the development of high-tech industries.

2.1.12 A new model in the process of knowledge creation

Knowledge creation and innovation are the result of an interactive learning process, which requires the creative and intelligent combination of various information and knowledge pieces, the socialization of a wide range of different experiences and competencies and the flexible management of complex roles and workflows of different actors as also the integration of scalable components and the support of complementary services in the solution of specific production problems.

As knowledge will play a dominant role in organisations, not only at the top but at all levels, the day to day work environment should favour learning processes that support, what Kessels (Kessels J.W.M., in: Schreinemakers J.F. (Ed.) Knowledge management, Organization, competence and methodology, 1996, p. 168-174) tends to describe as the process of 'knowledge productivity'. Knowledge productivity involves signalling, absorbing and processing of relevant information, generating and disseminating new knowledge and applying this knowledge to the improvement and innovation of processes, products and services.

Learning processes support many of the elements in the description of the concept of knowledge productivity (Kessels, 2001). Learning to learn is a competence of universal value and importance. Individuals need this special learning ability to remain abreast of constantly changing working conditions. This applies more than ever when knowledge productivity becomes the main economic drive. Subsequent elaboration of proficiency in learning to learn requires a conceptual basis that focuses on insights into meta-cognitions and self-regulation to support these learning processes.

For their part, recent studies have developed analytical models in order to explicate the changes underway in academic knowledge production. One such model is "new knowledge production" of Gibbons et al. (1994) and Nowotny et al. (2001); another is "entrepreneurial science," posited by Etzkowitz (1996, 1998), Etzkowitz et al. (2000) and Etzkowitz and Leydesdorff (2000).

According to the "new knowledge production" model, a new mode of knowledge production (termed Mode 2) has been developed since the 1940s and has acquired a comparable, if not greater, importance to that of the traditional mode (Mode 1). This new mode's chief characteristics are problem-solving research orientations, the involvement of economical and political actors in the definition of research priorities, the strengthening of transdisciplinarity and the multiplication of research sites outside the university.

According to this model, such practices have become sufficiently widespread that "the capitalisation of knowledge appears to be taking increasing precedence over disinterestedness as a norm of science" (Etzkovitz et al. 2000, p. 315).

Lundvall argues that we ought to expand the range of objects of study beyond the knowledge institutions, such as universities and laboratories, to the more general arena of routinised learning (for example, learning-by-doing or learning-by-using) `which emphasise knowledge creation as a by- product of routine activities' (Lundvall B.A. 1998, p. 35).

In a learning economy innovation is understood as an interactive learning process, which is socially and territorially embedded and culturally and institutionally contextualized (Lundvall B.A., 1992). It emphasizes a dynamic approach to innovation rather than the more static approach adopted in the knowledge-based economy that emphasizes access to a stock of specialised knowledge (Lundvall B.A., Archibugi D. (Eds), Oxford 2001.

2.1.13 The role of institutions in the knowledge economy

In contrast to traditional linear models, modern theorists argue that the process of innovation is highly interactive and is dependent upon social and cultural institutions and conventions (Morgan K., 1997, p. 493).

As a consequence of the importance of know-how, it is the network or organised market governance structure (see Powell W.W., 1990, p. 295-336) that is perceived to best support trust that facilitates interactive innovation (Lundvall B.A., Johnson B., 1994; Morgan K., 1995, 1997; Cooke P. and Morgan K., 1993, p. 543-564).

Knowledge is channeled within networks by formal and informal institutions. In principle, explicit and codified knowledge may be traded on markets. On the contrary, tacit knowledge competencies and skills, can not be transferred effectively through conventional markets and requires non-market allocation: for instance, within the firm, in the context of inter-firm networks or forms of co-operation between private agents and public institutions.

Thus, institutions have a key role in the process of innovation and in the generation and working of "knowledge and learning networks".

Connectivity between the various institutions should be a central concern of policy. Governance of knowledge and innovation networks according to the "Territorial Knowledge Management" approach (Cappellin, R., 2004, p. 303-325) implies a continuous public investment in the development of technical standards, social norms, and organizational, financial and institutional solutions, which may facilitate the adoption of innovation.

Governance is the challenge of steering and positioning complex organizations. These can be committees, research groups, firms, networks, communities, regions and international agencies. Ultimately, it is a matter of leadership, responsibility and vision when it comes, as it does daily, with technology and society. A requirement is for policy groups to become highly adaptive organizations. It requires becoming effective signal processors, organizations that incorporate learning in their strategy (de la Monthe J. (Ed.), 2001).

Institutions play a crucial role in innovation networks, since they:

- reduce transaction and production costs,
- increase trust among economic and social actors,
- improve entrepreneurial capacity,
- increase learning and relational mechanisms,

- reinforce networks and cooperation among the actors.

In a recent book Mokyr (Mokyr J., 2002) has argued that the industrial revolutions need to be explained by the development, but mostly by the diffusion and use of new knowledge. Thus, it can be considered a coincidence, in a way, that England around 1780 was the first country where sustained economic growth based on the use of newly developed knowledge could be observed. England was by no means the most technologically advanced country, and indeed it used knowledge developed in countries such as France extensively. Mokyr points to the institutions of English society that lowered the costs of communication about new knowledge. The result was that knowledge was much more readily exchanged among savants, among fabricants, and between these two groups. Thus, new knowledge was more easily created, but most importantly existing knowledge was put to good use faster, even if the knowledge would be of a tacit nature (cf. Cowan et al., 2000, p. 211–253).

Communication then, in Mokyr's argument, will both broaden and tighten the knowledge base of propositional knowledge, and stimulate the development of techniques ("prescriptive knowledge) "that find an immediate application in society and stimulate economic activity. Central in Mokyr's analysis is his concept of the "access costs" people face when in need of "useful knowledge".

The process of knowledge creation has a local dimension. Learning can be considered as a social process of ongoing development embedded in a specific regional socio-cultural context. As the creation of new knowledge implies an intense process of interaction, the concept of sectoral/geographical clusters deserves special attention. Within clusters, "social capital" and trust relations between local actors can be seen as a conceptualization of the glue that facilitates transactions, cooperation and learning in an uncertain world. Clusters and networks can then be regarded as economic clubs acting to internalize the problems of effective knowledge transmission.

To this degree, clusters and networks are a substitute both for formal markets and for hierarchical integration. Clusters represent subtle and differentiated "institutions" for co-operation and interactive learning.

The spatial patterns of innovation and the related geographical dimension of economic and social development have witnessed a renewed and increasing interest in the literature (Cooke P., Morgan K., 1998, Storper M., 1998), but attention is to be focused on the ability to build social capital, including interactive learning, local externalities, and

networks among institutions (Swann G.M.P., Prevezer D.K., Stout D.K., 1998). This focus on relational assets is part of the ‘‘institutional turn’’ in regional development studies as a result of the relative failure of classical approaches, which sought to privilege either ‘‘state-led’’ or ‘‘market-driven’’ processes regardless of time, space, and milieu.

Uncertainty is high in its production (i.e., research),but this drops rapidly as it is diffused. There is considerable social leakage in the transmission of knowledge. There are also considerable spill-over effects which result in secondary benefits of proximity to the source of knowledge production, such as the development of high technology clusters, the attraction and retention of skilled workers, the attraction of investment, and the spinning off of new firms, jobs, and industries.

2.2 ESPON results

The review of ESPON results is based on the latest reports available for each project. Thus, e.g. for the finalised projects only final reports have been considered. This proceeding follows the assumption, that all major information and results are included in the final reports and were not only mentioned in one or the other interim report.

2.2.1 Definition of terms relevant for the information society and related indicators used in ESPON

Different aspects of the development of an information society or knowledge-based economy (KBE) or knowledge economy are subject of a number of the reviewed ESPON documents. Both terms are often used along the lines of economic or technological aspects like the spread of e-commerce firms or the quality and usage of ICT infrastructure. This understanding of IS and KBE is complemented by a range of indicators used in different contexts of the different projects (see Table 2).

But also a broader understanding of the concept of the IS is being discussed, which goes beyond technical aspects and includes the social dimensions of these developments (2.2.1, p.19). Also a few indicators take account of these aspects, like the access of all segments of the population to education and virtual learning (2.2.1, p.111) or the access to communication infrastructure among excluded groups (see Table 2).

Much more widespread than the appearance of the term 'knowledge-based economy' is the usage of 'knowledge economy' in the reviewed documents. However, in all cases, these terms are related to the respective project's specific topic. Consequently, IS or KE and other related terms' references are regarded as influence etc. in these contexts rather than being discussed for their own sake.

The aspect of research and development is very often mentioned in combination with its relevance for spatial developments. For instance, it is described as a 'potential in addressing the spatial positioning and strengthening regional specialization' or referred to as 'a policy sector with relevance for polycentricity' (2.2.1, p.147). Next to its importance in economic development it is also considered as a possible means to address some negative environmental aspects in fields like transport etc. (2.1.1, p.262).

Table 2 Selected indicators relevant for the IS and their use in the reviewed ESPON reports

Term	Indicator	Source
Knowledge	Number of students attending higher education institutions	1.1.1, p.9
Knowledge	Adult literacy rate	3.2, 522
Knowledge functions	Location of university, number of students	1.1.1, p.85, 89ff
Access to knowledge	Relative share of pop. finding university education within the region	1.1.2, p.175
Access to knowledge	Identified by access to cities… Access by car to the three closest cities of more than 100000 inhabitants to respect the freedom of choice of the citizens Accessibility by car to cities of more than 200000 inh.	1.2.1, p.17
Access to knowledge	Development of local learning centres	2.2.1, p.108
Knowledge economy	Internet connectivity	2.2.3, p.8
Innovation	Population density (higher pop.dens. facilitates contacts, thus accelerates information flows)	1.1.2, p.58, 190
Innovation	Employment in high & medium high-tech manufacturing Employment in high-tech services Working age population with tertiary education Patents	2.1.2, p.31,35,37,123
Innovation	High-tech patents in mill. population Human resources in science technology R&D capacity	3.1, p.167
Innovation	R&D personal, R&D infrastructure	3.2, p.174
IS (participation in IS)	Usage of internet (number of users) Mobile telephony	1.2.2, p.106,187
Knowledge & IS	N° of e-learning institutions N° of municipalities with e-government N° of firms with internet access, own website N° of e-commerce firms	3.3, p.39ff
IS	Access to communication infrastructure among excluded groups	2.2.1, p.108
R&D	Expenditure Employment	2.2.2, p.17,22

For the measurement of R&D, indicators such as R&D expenditure, R&D employment or data accessibility are used (2.2.2, p.17,22). Particular emphasis on R&D issues is given in respective ESPON project dealing with R&D impact assessment. Here, many more related numerous indicators have been developed and used.

Innovation is generally considered as one of the most important forces in regional development in the EU, promoting the components of a new governance culture, like interconnectivity, information, communication and horizontal networking (2.3.2, p.81). Innovation is described as consisting of (and thus can be measured by) new or improved products, processes, policies, systems or services (2.1.2, p.35). More detailed indicators used within the ESPON projects are listed in Table 2.

While the usage of most of the above discussed terms of the IS has been quite frequent and randomly spread in the reviewed documents, other aspects of the IS like information and communication technology (ICT) or high-tech industries appeared much less often. They were mostly limited to specific projects and reports. ICTs are mentioned a few times as an important 'European level driver' (2.2.3, p.58) and are described as factor improving the contact between the business sector and the public administration (2.2.3, p.69).

2.2.2 Spatial impacts of the information society

While above table shows that a range of indicators has been already used when studying aspects of the IS in different contexts, a certain lack of definitions and indicators still prevails. This becomes especially visible when trying to assess the spatial impacts of IS-related issues. Many ESPON projects complain about the lack of data regarding knowledge flows. Project 1.1.3 for instance offers information on various potential barriers and opportunities to cross-border knowledge flows, but the flows themselves are not examined. Another example is the Pre-accession aid project (2.2.2), where a lack of appropriate indicators raised problems with evaluating the respective impacts (2.2.2, pp.41, 167).

Therefore, the assessment of spatial aspects of the IS is very limited and statements towards these questions rarely appear in the reviewed documents. Also IS policy concepts or recommendations are mentioned sparsely, and if so, hardly any further detailed information on the concepts or strategies is provided (e.g. 'regional innovation strategy' in Sheffield, see 2.2.3, p.69).

Some ESPON project documents contain case studies, which include aspects of establishment of IS functions or growth of the knowledge economy, for instance by looking at the promotion of start-ups, university research or the establishment of research centres (e.g. 2.2.3). For the respective regions, which have been examined, they can provide useful additional information. However, this information is not useful for cross European analysis.

Table 3 Selected case studies with relevance for the IS in reviewed ESPON reports

Project	Relevant Case Studies
1.1.1 Polycentrism	Country reports for EU 25+2+2
1.1.2 Rural Relations	Case studies, some referring to knowledge creation (useful)
1.2.2 Telecommunication	2 case studies in telecommunication networks (Nordic experiences + Estonia
2.1.2 Impact of R&D	Case studies on R&D, with high utility regarding methodology
2.2.1 Structural Funds	Country reports on territorial effects of SF and inclusion of Lisbon themes
2.2.2 Pre-accession aid	Case studies, some referring to establishing IS
2.2.3 Urban in SF	Case studies on growth of knowledge economy in sample regions
3.3 Lisbon	Case studies, few results so far, but might be helpful in the future

Somewhat more useful information might be obtained from examining the spatial scenarios in project 3.2. Special IS-related scenarios investigate the interconnectedness and also contradiction of the development of the IS on the one hand and the realization of cohesion policy goals on the other hand. As one scenario claims, current cohesion policies of the EU seem to stand in the way of reaching the aims of the Lisbon strategy. Future dimensions of EU expenditure and the overall aims of these policies are widely discussed, and some future spatial trends related to the IS can be derived from the examples given with the scenarios (see 3.2).

2.2.3 Typologies

In some of the ESPON projects typologies have been developed in order to classify certain regions according to different IS-related aspects. Some of them give important hints for the further development of indicators in IS research, others should be reviewed for specific research questions. Especially the typologies developed in the projects about Polycentrism (1.1.1), Enlargement (1.1.3) and Telecommunication (1.2.2) offer some typologies that might prove useful for further development of indicators and methodology in IS-related research (see Table 4).

Table 4 Appearance of relevant typologies in ESPON reports

Project	Relevant Typology
1.1.1 Polycentrism	Classification of European FUAs concerning knowledge functions (high utility)
1.1.3 Enlargement	Typology of border regions concerning their potential of integration (level of exchange of knowledge, best practices etc.)
1.2.2 Telecommunication	Numerous maps and typologies in fields of ICT infrastructure and usage
2.1.2 Impact of R&D	Several typologies describing R&D and innovation capacity

2.2.4 Conclusion

Since the development of an information society is considered as a prerequisite of the competitiveness of the EU, and increasingly seen as a horizontal and cross-sectoral policy concern (2.2.1, p.19), IS research should be further developed in an interdisciplinary manner. While some useful information can be obtained from a number of ESPON project documents, a lack of methodology and indicators was apparent as well, especially in the field of research on the spatial impacts related to the IS. Therefore, ESPON project 1.2.3 aims at using the available information and results from other ongoing and already finalised projects, while simultaneously searching for more specific IS related aspects. For instance, above mentioned typologies could be used for further typology development, focussing on influences and effects of IS related developments.

2.3 EU sources

2.3.1 Definitions of IS related terms

The Information Society is an integral element of the revised Lisbon Strategy - building Europe as most competitive and innovative economy in the world. Therefore it has been treated as a horizontal issue, that is an issue that should be taken into account and developed throughout all EU policies and activities (although main areas are: telecommunications policy, support to technological development in information and communication technologies - ICT, competitiveness of the Community's industry, trans-European networks - TEN in transport, energy and telecommunications sectors, research policy).

As a result, there are multiple research initiatives undertaken by different DGs, under different financial programmes.

The backbone of the IS activities, support and promotion actions is eEurope 2005 (a follow up of eEurope 2002) – an Action Plan for IS development, presented at the Sevilla European Council (Com2002/263)[1]. On the practical basis it is supported by i2010 - an initiative which will provide an integrated approach to information society and audio-visual policies in the EU, covering regulation, research, and deployment and promoting cultural diversity.

There is no clear unified definition of IS. However, as can be found in EU legal basic sources (SCADPLUS), the information society is synonymous with what is meant by "new information and communication technologies" (ICT) and their usage. It includes number of aspects and fields of activities. At the moment the umbrella term for EU actions related to Information Society is eEurope[2].

eEurope has been the object of monitoring and benchmarking. Therefore the system of 23 indicators has been developed – which in practice can be ragarded as a kind of an operational definition. They include such items as (for full list see: Council Conclusions, 13493/00, LIMITE, ECO 338):

- % of population who regularly use the internet
- % of households with internet access at home
- internet access costs

[1] eEurope 2005: http://europa.eu.int/information_society/eeurope/2005/index_en.htm
[2] European Commission (2002) eEurope 2005: An information society for all, Com(2002)/263 final

- speed of interconnections & services, etc.

However they do not have specific regional aspect.

2.3.2 The IS spatial perspective in EU research and policies

The main sources of IS consideration in spatial perspective are activities financed by DG-Regio, in the framework of Structural Funds[3].

There is only one relevant study that considers IS in a regional perspective, covering the whole EU - the Thematic Evaluation of the Information Society. The aim of this study was to investigate to which extend the IS issues are supported in regions using Structural Funds. Definition of the IS used was: "economic, social and institutional processes in which ICT related changes are embedded". The main reference framework was eEurope Communication (Technopolis, 2002).

The study reviewed all strategic documents – that is OPs, and census of regional programmes (over 150) and checks to what extend IS related actions exists in particular programmes. Therefore, focusing on strategic and planning sides of the process, this study has limited relevance to the actual project.

Apart from the Thematic Evaluation of the Information Society study, there are number of initiatives that focus on some of the EU regions. The example of this is IRISI (Inter-Regional Information Society Initiative) and its later coordination platform – ERIS (European Regional Information Society Association) that covers 45 European regions. Its activities focus on practical approach for developing regional strategies for Information Society and pilot projects concerning regional cooperation for IS. Similar to this is IANIS which aimed at development of so-called e-Regions hub, which is establishing networking and knowledge transfer between regions of old and new EU member states in the field of information society. These initiatives are practice oriented, the do not dwell on definitions (they usually take the main EU one) or situation analysis but rather combine different approaches into one action plan. They also have limited spatial perspective (selected regions of EU)[4].

Outside the DG-Regio there is only one fully developed operational study that deals with IS spatial aspects. This is BISER - Benchmarking the

[3] IS in DG-Regio:
http://www.europa.eu.int/comm/regional_policy/themes/infotech_en.htm
[4] IANIS: http://www.ianis.net/

Information Society: e-Europe indicators for European Regions, Information Society Technology Programme[5]. The aim of the BISER project is to develop, define and pilot statistical indicators for measuring and benchmarking the impact of knowledge economy on Europe's regions, based on a model of factors influencing regional development. Each regional economy and society is examined in the context of the underlying structural foundations of the Information Society. The latest benchmarking exercise covers 28 EU regions. For its purposes 20 indicators were used (group in two groups) – their level inform on IS development (see Table 5).

Table 5 BISER IS benchmarking indicators

Population-side indicators	**Establishment-side indicators**
Broadband access to the Internet (population)	Broadband Internet access (establishments)
Internet users (population)	Establishments with an internal computer network
Private e-government users	Business e-government users
Share of employment in ICT-Occupations	Establishments with a website
ICT-based multi-locational work	Establishments with at least 10% of sales conducted online
E-learning for work-related training	Participation in electronically integrated supply chains
Users of transport related information on the Internet	IP-supported process and product innovation
Online communication with doctor/clinic	Establishments providing ICT training for their staff
Use of the Internet for regional purposes	More than 25% of staff need Internet skills
Ratio of Internet use – lower and higher incomes	
Internet affordability insufficiency	

BISER: http://www.biser-eu.com/

This study is highly relevant for the purposes of this project.

2.4 OECD sources

2.4.1 Definitions of IS related terms

Although the term „Information Society" is seldom use in Organization for Economic Co-operation and Development (OECD) sources, the

[5] BISER: http://www.biser-eu.com/

research conducted by this organization to a great extend deals with that issue. As an organisation providing economic policy advice to its member governments, OECD recognises that future economy will be an "information economy" and society will be increasingly an "information society". The contribution of "information economy" to overall economic growth and performance in OECD publications is related to the amount of resources devoted to new information technologies (IT), whether in terms of consumption, investment or innovative efforts (OECD, 2002, p. 10).

Term "knowledge-based economy (KBE)" is more commonly used in OECD documents. It is defined as economy "where knowledge (codified and tacit) is created, acquired, transmitted and used more effectively by enterprises, organisations, individuals and communities for greater economic and social development. It calls for:

- An economic and institutional regime that provides incentives for the efficient use of existing knowledge, for the creation of new knowledge, for the dismantling of obsolete activities and for the start-up of more efficient new ones.
- An educated and entrepreneurial population that can both create and use new knowledge.
- A dynamic information infrastructure that can facilitate effective communication, dissemination and processing of information.
- An efficient innovation system comprising firms, science and research centers, universities, think tanks, consultants and other organisations that can interact and tap into the growing stock of global knowledge; assimilate and adapt it to local needs; and use it to create new knowledge and technology" (OECD, 2001, p. 13-14).

In other words: "The knowledge based economy is an expression coined to describe trends in advanced economies towards greater dependence on knowledge, information and high skill levels, and the increasing need for ready access to all of these by the business and public sectors" (OECD, 2005, p. 71). Knowledge and technology have become increasingly complex, raising the importance of links between firms and other organisations as a way to acquire specialised knowledge. A parallel economic development has been the growth of innovation in services in advanced economies.[6]

[6] http://www.stats.oecd.org/glossary/search.asp

The OECD documents broadly discuss questions on the role of information and communication technologies (ICT) in economic growth and social change. The ICT sector seems to be the basic term used in relation to IS and it is defined as "a combination of manufacturing and services industries that capture, transmit and display data and information electronically" (OECD, 2002, p. 81).

The most important outcome of the research on information economy is that the production, diffusion and use of ICT vary considerably between and within countries, although they continue to spread and their economic importance has grown over the 1990s.

To overcome the problem with ICT measurement the OECD and Eurostat, together with statistical offices in OECD member countries, have worked together to develop common definitions, common methods and common surveys of ICT. OECD publications on that build mainly on the work of the OECD Working Party on Indicators for the Information Society (WPIIS), which is composed of representatives from national statistical offices (NSO) of OECD member countries (OECD, 2002).

The Working Party has agreed on several standards for measuring ICT. Besides the definition of industries producing ICT goods and services (the "ICT sector"), they cover the definitions of e-commerce and Internet transactions, and model questionnaires and methodologies for measuring ICT use and e-commerce by businesses and households/individuals[7].

OECD Information Technology Outlooks presents the results of the WPIIS research. The Outlooks discuss the information technology (IT) as a major driver of economic change, restructuring businesses, affecting skills and employment, and contributing to growth. The latest (2004) edition of the Outlook describes recent market dynamics and gives a detailed overview of the globalisation of the information and communication technology (ICT) sector and the rise of ICT-enabled international sourcing. It analyses the development and impacts of electronic business processes and describes trends in industries supplying IT goods and services. The publication provides as well an overview of IT policy priorities in OECD countries and how these are evolving.

It must be said that the OECD has been taking a leading role in the international debate on measuring ICT. The OECD is involved in the The World Summit on the Information Society (WSIS). It is an initiative of the UN specialised agency, International Telecommunications Union (ITU)

[7] www.oecd.org/sti/measuring-infoeconomy

which objective is to "build the framework of an all-inclusive and equitable Information Society" and find ways to use Information and Communication Technologies to advance development goals, such as those contained in the Millennium Declaration[8].

Additionally OECD publishes the biennial reports *Communications Outlooks* (1998-2005). The reports analyse communication policy in 30 OECD member countries. The latest one (2005), addresses the issues of policy, regulation, and the size and structure of the telecommunication and broadcast markets, including mobile communications, leased lines and research and development (OECD, Communications Outlook 2005).

Other periodical publication related to IS definition is *The OECD Science, Technology and Industry Scoreboard*. The latest, seventh edition (2005) brings together the latest internationally comparable data to explore the growing interaction between knowledge and globalisation. It draws mainly on OECD databases, indicators and methodology developed by the Directorate for Science, Technology and Industry and focuses on:

- R&D and innovation: investment in knowledge, the financing and performance of research activities, linkages in innovation systems, science and engineering publications;
- Human resources in science and technology: university graduates, R&D personnel, the international mobility of scientists;
- Patents: "triadic" patent families, patents in new technological fields, cross-border ownership of inventions;
- ICT: resources and infrastructure for the information economy, the diffusion and use of Internet technologies and electronic business, the contribution of the ICT sector to economic activity and international trade;
- Knowledge flows and the global enterprise: key channels of economic integration and technology diffusion, including foreign investment, the role of foreign-owned affiliates, as well as the contribution of multinationals to productivity;
- The impact of knowledge on productive activities: comparison of OECD economies in terms of income, productivity and industrial performance, the growing importance of technology and knowledge-intensive industries, the interaction between services and manufacturing, and the changing nature of manufacturing.

[8] For more information on WSIS and in its second phase, the "Tunis Summit", to be held in Tunis from 16-18 November 2005, go to www.wsis.org.

2.4.2 Spatial dimension of OECD research

Although research undertaken by the OECD is of high relevance for ESPON 1.2.3 project, the OECD international statistical comparisons are devoid of regional breakdown and the lack of regional references is evident in the OECD analyses.

There are only few relevant studies that deal with IS issue in a regional perspective. Although they do not preset the overall picture of spatial differentiation of the IS, the selected OECD studies have regional dimension and investigate IS using the case study approach. Thus they seem to be important from the ESPON 1.2.3 project's point of view.

The most valuable one is the report that addresses specific strategies relevant to the dissemination of ICT in rural areas (OECD, Information and Telecommunication Technologies…, 2001). It consists of two parts: theoretical and empirical based on the several case studies.

Accordingly to this report the implications of ICT for the development of rural areas can be seen in terms of – at the same time - risks and opportunities. The risks are those of seeing ICT infrastructure and services continue being deployed preferentially where the most important and receptive customer bases are located. This would leave many rural citizens and businesses out of the Information Society and the Knowledge Economy for a long time, and probably aggravate existing economic difficulties. The opportunities, on the other hand, offer added value, since ICT tends to diminish the constraints linked to time and distance. A certain number of activities can now be located outside of traditional production centres, whereas a wide range of public services can be efficiently delivered through ICT to sparsely populated or remote areas. Risks and opportunities appear in three major areas that are analyses in the report: fundamental issues common to all policies and projects, societal issues, and overall economic issues.

The case study approach was undertaken in order to show that growing number of activities are performed in multiple locations that are not necessarily urban. The case studies conducted within the framework of the report have been chosen on the basis of several criteria: 1) a clear ICT strategy with ambitious but not unrealistic goals; 2) the involvement of the population in projects; 3) the usefulness of analysing different strategies, policies and projects at various geographical scales: regional, sub-regional and communities.

Another study which deals with regional approach towards IS and KBE developments is "Cities and Regions in the New Learning Economy". This publication analyses the relationships between various forms of learning

and economic performance at the regional level and provides rather strong evidence of the importance of individual and firm-level organisational learning for regions' economic performance. Case studies of five regions and cities indicate that social capital – in terms of social networks and social conventions and norms – affects both individual and organisational learning. In particular, they give many examples of the ways in which a low stock of social capital can impede learning (OECD, Cities and Regions…, 2001).

2.5 Conclusions

Both Information Society and Knowledge Economy are the terms most often used in everyday language, as well as in official documents. These terms are mot defined in a precise, theory-based ways, and even more – particular organisations and institutions propose their own understandings of these terms. In several case operational definitions are being used through proposing a set of indicators that are supposed to measure processes and phenomena related to both terms.

Since the uniform and commonly accepted definitions of neither Information Society nor Knowledge Economy exist, the current project – at least at this stage of its implementation - will apply an operational approach to defining these terms, especially that of IS.

It will be done in the process of selecting indicators form case-studies and collecting data for a whole-European picture of regional differentiation of those manifestations of the IC which can be measured by available data.

It is acknowledged that this pragmatic approach is not the most perfect one and that a more comprehensive statistical coverage would be more desired. It is assumed that the project will result in a more elaborate approach to define the core terms. Also the policy recommendations will provide practice-oriented definitions and approaches.

It may be also assumed that the project will provide a deeper insight into the spatial aspects of IC and KE, which will be its specific added value to already existing knowledge in this sphere.

3 Common Concept of the Information Society (WP2)

As of the numerous definitions available for the term information society (see chapter 2) it is necessary to find an operational definition for the information society, which allows to conceptualise the analysis in accordance with the project's objectives. In this framework it is particularly important to identify appropriate indicators, which can contribute to the analysis of territorial aspects of the information society. Not all indicators describing one or another feature of the information society have a territorial feature. Thus, they need to be selected carefully. In addition, the following operationalisation of the definition aims at structuring the variety of possible indicators. Such a structure will be useful in order to develop the foreseen methodology.

3.1 Operational definition of the Information Society

Besides above review of definitions of information society related terms, it is also necessary to consider already taken alternatives of approaches towards operational IS definitions. Thus, in the following sections a few such approaches are shortly reviewed. Only approaches are mentioned, which are related to spatial issues of the IS, since this is also the focus of ESPON project 1.2.3.

One such approach of grasping elements of the IS in spatial terms are the *Regional Systems of Innovation*. This approach addresses localised structural and institutional factors which shape the innovation capacity in specific regional contexts. For the operationalisation the concept utilises qualitative and quantitative indicators aiming at the measurement of innovation generation and diffusion (See Immarino, S., 2005, In: European Planning Studies, Vol.13, No.4, pp.497).

Another concept reflects on *Learning Regions*. This approach considers successful and permanent learning of individuals and of organisations in the frame of networks as being crucial for the success in a knowledge based economy. This concept regionalises the ongoing transition towards a *learning economy*. The concept of learning regions is closely linked with a new generation of regional policy, which focuses on infostructure rather than infrastructure, on opening minds rather than physical opening and which promotes policies with SMEs instead of policies for SMEs (See Hassink R., 2005, in: European Planning Studies, Vol.13, No.4, p.521).

Finally, as compared to above theoretically based concepts also a very empirically driven approach shall be mentioned. The concept of *Measuring a Knowledge-based Economy and Society* by the Australian

Bureau of Statistics is based on five dimensions, namely innovation and entrepreneurship, human capital, ICT, economic and social impacts and a context dimension. The latter is a very broad dimension incorporating numerous background information and preconditions, including institutional environment. All dimensions are described by characteristics which in turn are operationalised by indicators (See Trewin, D., Canberra 2002). This approach offers the advantage of a detailed operationalisation and categorisation of IS characteristics and elements on a quantitative level. On this basis, for the purpose of ESPON project 1.2.3, it could be asked, how these dimensions evolve and how they impact on IS spatial development. The shortcoming of this approach is the limited availability of respective regional data – as they are indicated in this concept – for the whole ESPON space. Nevertheless, the categorisation can support the development of an operational and common concept for ESPON project 1.2.3.

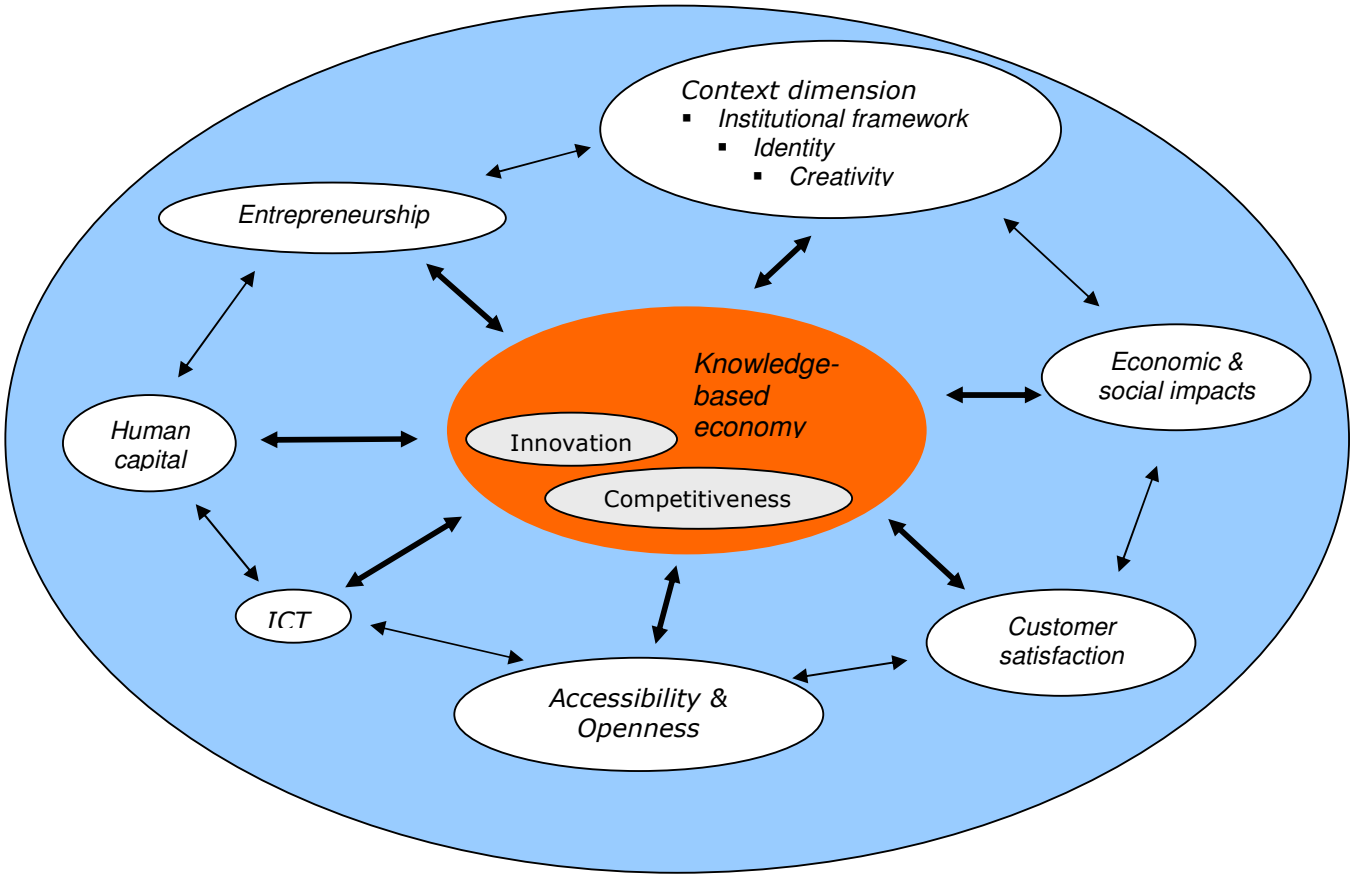
Before finally proposing a common concept, a few issues particularly relevant for the objectives of ESPON project 1.2.3 shall be reviewed shortly. In order to identify spatially relevant aspects of the IS, it is necessary to first make out the characteristics of the IS, among which the spatially relevant can be identified. In addition to the selection of indicators, spatial issues are taken into account, if it is asked, what the IS means for different types of regions. This relates to the question, how the IS can be measured in different types of regions. It can be assumed, that the IS reveals different characteristics in different types of regions. In order to take account of these regional differences it will be necessary to find appropriate relative formulations for the indicators finally used for the analysis.

In Figure 2 it is proposed to consider the knowledge-based economy as core of the IS. This concept represents a proposal for a combined approach of above concept *Measuring a Knowledge-based Economy and Society* and an approach of Cappellin (Cappellin R., 2003, In: International Journal of Technology Management, Vol.26, No. 2/3/4, p.303), which deals with territorial knowledge management. Thus, the proposed common concepts inhibits elements of a thematic approach to the IS as well as policy oriented aspects.

According to this combined concept, the KBE is element of a wider definition of the IS, which incorporates the different aspects of knowledge and information in economic and social life. While the KBE itself is based on permanent innovation processes and competitiveness of the knowledge intensive firms and sectors, it is also influenced by and interdependent with its frame of the IS. For instance, human capital

influences the performance of the KBE, as human resources are a fundamental production factor in such an economy. Similar relations can be drawn for the other elements 'surrounding' the KBE. In addition, also these dimensions of the surrounding space are interlinked with each other. The example of interrelations between the institutional context and the entrepreneurship illustrates these linkages.

Figure 2 Approach to an operational common concept for the information society



Source: own presentation

Summarising, the relevance of different issues for the IS in general can be noted. In order to analyse spatially relevant aspects of the IS, thus, these different dimensions need to be taken into account. Within these dimension, however, characteristics and indicators need to be differentiated as to whether they inhibit spatial relevance or not. For further operationalisation, a number of potential indicators is proposed in the next section and assigned to the different elements of the IS.

3.2 Proposed set of indicators

The following set of proposed indicators has been developed independently from respective data availability. The proposed list aims at theoretically desirable indicators rather than proposing an indicator list which can be utilised on NUTS 2 or 3 levels for the whole ESPON space. This review is part of the following chapter. The actual use of indicators in different methodological steps will still have to be decided about.

Indecisive of the data availability at different spatial levels, this theoretically or concept driven indicator list matters, since ESPON project 1.2.3 has envisaged a step-wise methodology, in which besides a cross European regional analysis, also cross European national as well as regional analyses for selected countries of the ESPON space are envisaged.[9] Furthermore, this consideration of indicators might also be useful for the further development of the envisaged case studies.

In addition, the analysis of spatial aspects of the IS is embedded in general regional socio-economic conditions, which – according to above understanding – are not part of the context dimension. Nevertheless, they need to be considered. Since these conditions and developments are part of different ESPON projects and the respective indicators are part of the ESPON data base, these further socio-economic conditions (such as GDP per capita), not specifically related to the IS, are not considered in below indicator list.

While below list is not approved in terms of actual use and availability of respective data, it also neither claims to be complete. The aim of below list is to point out the possible indicators which could be utilised for the description of one or another aspect of the IS. Thus, it is a sampling list of indicators. Further indicator list elaborations should be closely linked to data availability, as already early data reviews have indicated the very limited availability of comparable regional data across the ESPON space (see following chapter).

Indicators of the knowledge-based economy:

- Expenditure on technological innovation by region
- Productivity of regional industries by selected sectors
- Relative number of patents by region

[9] For the corresponding methodology see chapter 5.

Entrepreneurship indicators:

- Relative number of regional business start-ups
- Proportion of SME enterprises by industry

Measures for human capital:

- Human capital index or share of regional population with tertiary education
- Knowledge workers as share of regional labour force
- Share of researchers in regional labour force
- Expenditure on education and/or research as share of regional GDP

Indicators for ICT availability and access:

- Share of enterprises with internet access
- Share of enterprises with own homepage
- ICT sector employment as share of total regional employment
- ICT sector value added as share of total regional value added
- Number of mobile phone subscriptions per 100 inhabitants

Accessibility and openness indicators:

- Direct regional net investments from abroad
- Direct regional net investments abroad
- Relative passenger numbers of interregional flight and train connections
- Share of foreign citizens working in knowledge industries and services

Indicators describing economic and social impacts:

- Regional GDP per capita
- Regional labour productivity
- Exports of education and training services

Context dimension indicators:

- Regional macroeconomic indicators
- Age structure of regional population
- Organised criminality index
- Regional participation in community activities

While above indicators have been defined only in static terms, for many indicators, theoretically, it would also be possible to define them in their dynamics, i.e. indicating their change over time. In addition, for all these dimensions additional static and/or dynamic indicators could be listed, however the availability of the majority of these further indicators could be doubted for the regional level in particular.

4 Overview of Data Availability (WP3)

4.1 Towards quantitative analysis: sources of data available on the European and national level

One of the key objectives of ESPON TPG 1.2.3 is to consider the development and use of a set of information society (IS) indicators as a component of evaluating the spatial pattern of the recent IS development in EU25+2+2. The tender states an objective aiming at the ”Characterisation of the information society from a territorial perspective – identification of the information society's state and trends, typology development on the realisation of information society, relation between traditional regional competitiveness indicators etc. and information society specific indicators”. For achieving this objective, both the qualitative and the quantitative approaches measuring the state of IS from the whole ESPON space are required. This section takes a very first tentative look at the quantitative side, reviewing the current availability of IS indicators in the ESPON space, with a territorial point of view.

In general, IS indicators describe the level of information society development achieved in a particular society in quantitative terms. They can serve a range of purposes related to providing a view of the society’s state: for example, following the evolution of IS or benchmarking IS with other territories. By considering changes over time, IS indicators also comprise a critical tool in the monitoring, evaluation and improvement of IS policy. Inevitably, the primary benefit of indicators lies in this capacity to guide policy-makers into proactive thinking i.e. to focus their attention on future priorities.

Constructing a comprehensive set of IS indicators is a notable task, requiring both a solid scientific background and a remarkable empirical effort to collect the data needed to establish meaningful benchmarks and to measure change. In other words, the set of IS indicators should base on a sound and an observable definition of the information society. The task becomes complicated as it seems that IS is more or less “undefined”

at the moment (see Chapter 2). This means that IS is what one wants it to be, according to one's own personal interests, political goals or rhetorical interests. In this setting, countries held as "information societies" are those which people think of being such – and not defined by, for example, achieving a level measured by some quantitative IS-related indicators.

Table 6 Sample of information society indicator projects in the EU

Regional focus	Project	Year	Territorial level	Source
EU country	ESIS[10]	2000	EU15, NUTS0	Public sources
	SIBIS[11]	2002	EU15, partly EU27, NUTS0	Interviews
	Eurobarometer[12]	2002	EU15, NUTS0	Interviews
	Eurostat InfoSoc Pocketbook 2003 edition[13]	2002	EU15, NUTS0	Interviews
	E-Business Market Watch[14]	2005	7 EU countries, NUTS0	Interviews
EU territories	BISER[15]	2003	28 NUTS2 regions in EU15	Interviews
	INRA[16]	2004	EU15, partly NUTS2	Interviews
	ESPON Telecom[17]	2004	EU25+2+2, partly EU15 NUTS0, partly NUTS2	Previous projects, simulation
Nordic countries	Nordic Information Society Indicators[18]	2002	4 Nordic countries, capital vs. other regions	Interviews,
Finland	Statistics Finland[19]	2002	Finland, NUTS3	Interviews

While IS is actually a very recent phenomena, numerous empirical projects have aimed to empirically measure and quantitatively monitor different aspects of it. This substantial body of work has been carried out by various actors: supranational organisations (See, for example OECD, 2004, ITU, 2004, EUROSTAT, 2004), national statistical offices, research

[10] http://www.eu-esis.org/
[11] http://www.sibis-eu.org/
[12] http://www.gesis.org/en/data_service/eurobarometer/
[13] http://epp.eurostat.cec.eu.int/portal/page?_pageid=1073,46587259&_dad=portal&_schema=PORTAL&p_product_code=KS-56-03-093
[14] http://www.ebusiness-watch.org/
[15] http://www.biser-eu.com
[16] http://europa.eu.int/information_society/policy/ecomm/info_centre/documentation/studies_ext_consult/inra_year2004/index_en.htm
[17] http://www.espon.lu/online/documentation/projects/thematic/1864/fr-1.2.2_revised.pdf
[18] http://www.stat.fi/tk/yr/tietoyhteiskunta/nordic_iss_02.pdf
[19] http://www.stat.fi/tk/yr/tietoyhteiskunta/

projects, consultant agencies etc. In order to get an insight on how the "territorial dimension" has been acknowledged, a review for the recent work in this field was undertaken. Table 6 presents a sample of projects having collected IS indicators in the ESPON space since year 2000, complemented with a regional analysis of the Nordic countries and a Finnish IS project.

Table 6 reveals that in recent years several different actors in Europe have been simultaneously working with IS indicators. While many of these projects may be considered a pioneering work in this field, the somewhat overlapping attempts may also indicate a poor coordination in this very first phase of collecting the IS data on the European or the EU level. Another distinctive feature is the common methodological approach of collecting the data via interviews, indicating that the up-to-date and publicly-available statistical sources are either of inadequate quality or totally lacking. The two projects which use public sources use either the indicators of previous projects (ESPON 1.2.2) or collect their indicators on a country level (ESIS).

For the EU25, member countries' statistical offices, Eurostat, and more recently EU DG Infosoc do nowadays provide selected indicators on Information Society. However, territorial data is not commonly available through these sources as they concentrate on the country level. Some projects have collected territorial IS indicators, but the methodologies used tell the same story: they have to collect their data themselves in order to receive territorial IS indicators. For example, the ESPON TPG 1.2.2 analyzed the availability of telecommunications and also other IT, which can be regarded as belonging to the technological aspect of the IS. The project used information from Eurostat and INRA, of which the latter provided information on a territorial level for EU15 member countries. For the rest of the ESPON countries the indicators were simulated. As the technological aspect – the availability and use of IT technologies – is inevitably the most monitored IS indicator, the poor data-availability on a territorial level in the ESPON space clearly manifests that other IS indicators are even harder to find.

Table 6 also shows that the projects on the EU level have tended to broaden from including EU15 to include EU25 and even more countries. Moreover, it seems that the territoriality of IS has become of interest only recently. As collecting a territorially representative sample by conducting interviews requires remarkable efforts, the task has been reduced either to cover only selected regions from the observed countries (BISER), or by calculating IS indicators on the basis of other available data (ESPON 1.2.2.). Moreover, the only country specific

project in Table 7, measuring the state of the IS in Finland, collected data on the NUTS3 level. The projects looking at multiple countries have collected territorial IS data either at the NUTS2 level or compared the capital region with the rest of the country. International projects seem to be not that interested in lower than country level indicators.

The conclusions from this review are the following: i) While the situation is improving through eEurope monitoring process, there has been no coordinated collection of IS indicators for the whole EU or ESPON space; and ii) Territorial data measuring the IS is not available for the whole ESPON space.

The reasons for this are probably the following: lack of coordinated collection of IS indicators and the lack of resources needed to collect a territorially representative sample. Moreover, the vague definition of the term Information Society is reflected by the collected IS indicators. Table 7 presents the number and categories of indicators collected by the six selected projects. The collected number of IS indicators varies from 7 to 145, and one reason behind the difference in the number of indicators collected is the definition of IS. The used indicator categories reflect the projects' views of what the term information society actually means.

Table 7 Number of indicators and indicator categories in six information society indicator projects

Project (Year)	ESIS (2000)	Eurostat (2003)	BISER (2003)	INRA (2004)	ESPON Telecom (2004)	Statistics Finland (2003)
No of Indicators	30	34	145	10	7	28
Indicator categories	• Telecom markets • Telephone lines • Telecom equipment • Telecom prices • Personal computers • Internet • Television	• ICT sector • ICT market and external trade • ICT penetration • ICT usage in households • ICT usage in enterprises • ICT and education, training and skills • ICT government and health	• eGovernment • Transport • Healthcare • Regional identity • Business enterprise • Innovation and R&D • Work • Education, training and skills • Social inclusion • ICT infrastructure	• Fixed and mobile telephony • Internet	• Mature ICT availability and use • Broadband, e-commerce and Internet backbone	• Views of information society • Usage of phones, computer and internet • Usage of computers and IT networks in schools • IT at work • eGovernrmen t • Differences of ICT usage on the NUTS3 level

Following the approach of Webster (Webster, S., 1995), three different views of IS can be derived from the categories: 1) broad; 2) intermediate; and 3) narrow view of IS.

- The *broad* view follows Webster's original conceptualization of the information society into five definitions: technological, economic, occupational, spatial, and cultural. All these aspects are included in this broad view as well as spatial and cultural features such as regional identity and social cohesion and inclusion. Out of the projects listed, this view is represented by BISER.
- The *intermediate* view of IS includes technological and economic indicators in the data collection, such as the size of ICT sector, market and external trade. It also includes indicators measuring IT at the workplace, the state of eGovernment and health. This view is best represented by statistical agencies: Eurostat and national statistical offices.
- The *narrow* view of IS defines the IS technologically as it looks at the availability and usage of different ICT technologies (ECIS, INRA, ESPON Telecom). By doing so, the indicators measure the 'digital divide', the difference between the amount of users and non-users. This view relates with Webster's technological definition of the IS.

4.2 Towards case studies: sources and kinds of data available on regional level

The survey in the previous section showed that no extensive interregional comparisons basing on IS indicators have been made in the ESPON space. This can be either due to the lack of interest to the territorial level or due to the fact that there is no comprehensive set of territorial IS indicators available. Thus, a survey covering six ESPON TPG 1.2.3 partner countries[20] was carried out, aiming to find out what indicators these countries have collected on a territorial level, and whether it would be possible to create a unified set of indicators for fulfilling the future needs of this project.

The previous section also revealed that there is no unanimous view of what indicators should be collected for measuring the IS. This seems to be related with the vague definition of information society. Keeping in mind the resources and schedule, it was decided to use a relatively short

[20] Czech Republic, Finland, Germany, Hungary, Italy and Poland.

list of indicators, however representing a view as broad as possible (see, Table 3). The indicators were selected to represent the three categories: 1) ICT infrastructure and use (indicators 1-9); 2) ICT sector & R&D & Education (10-17); and 3) Purpose of use (18-21). Following the categorization in the previous section, this list would represent an intermediate view of IS. The partners were asked to check i) the availability of the listed indicators within the years 2002-2004, and ii) the territorial level of these indicators.

Table 8 Availability of IS indicators in six ESPON 1.2.3 partner countries, year 2004

#	Indicator	Availability, % of countries		
		National	NUTS2	NUTS3
1	Number of mobile phones subscriptions per 100 inh.	83%	17%	17%
2	Number of cable modem subscriptions per 100 inh.	83%	17%	0%
3	Number of xDSL subscriptions per 100 inh.	83%	0%	0%
4	Proportion of households with a computer	83%	33%	33%
5	Proportion of households with internet access at home	83%	50%	33%
6	Proportion of households with broadband internet access at home	83%	33%	17%
7	Share of enterprises with internet access	67%	17%	17%
8	Share of enterprises with own homepage	50%	17%	0%
9	Share of enterprises receiving orders over Internet	33%	0%	0%
10	ICT sector employment, % of total (as defined by OECD)	50%	17%	17%
11	ICT sector value added, % of total (as defined by OECD)	33%	0%	0%
12	R&D expenditure	67%	33%	33%
13	Private R&D expenditure	67%	33%	33%
14	R&D personnel and researchers, % of work force	67%	33%	17%
15	Number of patents	50%	17%	17%
16	Proportion of population with completed secondary education	50%	17%	33%
17	Proportion of population with completed tertiary education	50%	17%	33%
18	Percentage of population using the Internet for interacting with public authorities	83%	17%	0%
19	Percentage of population having used the Internet in relation to training and educational purposes	50%	0%	0%
20	Percentage of population using Internet to seek health information whether for themselves or others	50%	0%	0%
21	Percentage of population having ordered/bought goods or services for private use over the Internet in the last three months	67%	17%	0%

The results of this survey are presented in table 8 and they can be summarized in two main points as follows:

- As expected, the most comprehensive data seems to be available at the country level. The data for the previous years is even close

to complete: for example, from a total of 21 indicators, 18 indicators were available in all five countries for year 2002.

- While a number of territorial indicators are available – particularly for the technological aspects of IS – the results are not very promising from a viewpoint of quantitative analysis and territorial typology building. EU countries seem not to collect the same information on IS, and some aspects, such as purpose of use, are almost totally outside the scope of monitoring. Territorial data collected by individual member states is therefore usually unusable in international comparisons.

While the results of this survey are only tentative, some conclusions can be made in order to create future strategies for WP3. The two crucial decisions to be made are i) the methodology and spatial scale of the quantitative analysis in interregional and/or international comparisons, and ii) the nature, focus and number of case studies to be carried out in the project. At this stage, the following four scenarios can be derived:

1. The first scenario is that *territorial IS data is not available for more than a few of ESPON countries.* In this case the analysis of IS in the ESPON space has to rely on country level quantitative data and additional information on regional aspects of IS. The case studies, which would take a look at different indicators in different ESPON areas, could be such an additional information source. Conducting a full-scale survey on NUTS2 in ESPON25+2+2 countries is not a feasible strategy, because of the time and resource limits of the project. The tentative survey indicates this being the most likely scenario.
2. The second scenario is that *territorial data on IS indicators is available for all or most of the ESPON countries*. This scenario would enable a quantitative analysis of the collected indicators, and if this analysis would be considered extensive, the requirement for case studies would be different. This could mean, for example, analyzing some indicators more deeply, a comparison of selected indicators between some territories, or taking a deeper look at some region. This is indicated being the least likely of the scenarios by the tentative analysis.
3. In scenario three *IS data is available for most of selected IS indicators, but not for all the countries.* In this scenario the strategy could be conducting relatively broad case studies in countries, where IS data is not available. This would mean taking a closer look at the

countries where indicators are not available and making judgements of the countries and their regions' state of IS based on these case studies. In this scenario the number of case studies depends on the number of countries lacking regional IS indicators, being less than in scenario 1 but more than in scenario 2. This is the second most probable scenario, judging on the tentative availability analysis of IS indicators.

4. The fourth scenario would be a situation where *more or less all the countries and their regions can be fairly covered, but only by one or a couple of the selected IS indicators*. In this scenario, a feasible strategy to follow would be the conduction of case studies for those indicators, which are not found being available. The tentative survey in IS indicator availability would suggest that the likelihood of this scenario is the lowest.

4.3 Conclusions

This section presented a survey of projects having collected IS indicators. The survey provided the following information:

- Firstly, territorial information of IS indicators does not seem be available for the whole ESPON space.
- Secondly, most of the relevant IS information seems to be collected by national authorities and for country-specific purposes. This kind of data is usually non-comparable in an international setting.
- Thirdly, some of these national projects have taken a look at the information society at a very fine territorial level, as the very rare multinational studies are satisfied by the comparison of regions on a country level.

The survey also indicated that the vagueness of the definition of Information society was reflected by these projects, as no coherent list of indicators could be found. However, it could be concluded that there exist different views of IS, starting from a narrow technological view measuring the availability and use of ICT to the broad view of IS, which included more or less all aspects of a society to the concept. Based on this review, a list of IS indicators was created. The aim was to tentatively explore the availability of the selected 21 "core IS indicators" in the ESPON TPG 1.2.3 partner countries in order to evaluate the future directions of the qualitative part of the study in hand.

The survey indicated a lack of European wide regional data on IS. As a result, scenarios for considering future strategies were derived. The most likely scenario would be that a comparable set of territorial IS data is not available for more than a couple of ESPON countries. In this case, the best strategy would seem to be to rely on information provided by case studies. As probably some mixed data from some countries can be collected, one feasible focus of the case studies would be taking a view of different aspects of the IS. In this case, for example, each project partner could select the IS indicators not being available for his country or being considered actual in his country, and take a closer look at the territorial situation of them at also in the other countries missing this indicator. In any case, there is a tradeoff between the scope and number of the case studies to be made – the aim can either be at trying to cover all the ESPON space or at trying to form a picture of all the indicators at different types of regions.

The previous experience from ESPON 1.2.2, the "Telecom" project, showed that there is a north-south and an east-west division among ESPON countries by the used telecom indicators. If these same divides are found to exist measured by the IS indicators, one could justify taking a closer look at these four regions. The "telecom" project also identified some problems, which can be assumed to be present in the analysis of IS indicators. One is the problem caused by time. Firstly, if indicators are available for different countries, but they are from different years, they are not comparable. Moreover, the indicators which will be found are likely to be 2-3 years old. The development of telecommunications and the information society as a whole is so rapid that this information is already outdated. Because of this problem, it might be more reasonable to try to form a realistic overall picture by case studies, instead of trying to compare a set of outdated IS indicators representing different points of time.

5 Hypothesis Development and Proposed Methodology (WP2)

On basis of the common concept of the IS and the review of data availability, in the following section a tentative methodological approach shall be developed. This approach aims at analysing a number of research hypotheses, which have been developed in the early stage of the project. As of the above described limited data availability, it will be necessary to take a stepwise approach in order to consider different aspects of preliminary hypotheses. It is also expected that these research hypotheses can be further specified and, especially in the frame of the case studies, further hypotheses could be developed.

Besides this stepwise process analysing different kind of data at different spatial levels, the following methodology will also differentiate between the different logical steps which are inherent in the objective setting of the project. This twofold differentiated methodology is depicted in Table 9. On the one hand above mentioned stepwise process refers to the different spatial levels addressed in the analysis. On the other hand, the project follows – over time – different analytical steps.

Table 9 Spatial and analytical steps of proposed methodology

		Analytical steps		
		Descriptive analysis	Impact analysis	Spatial Assessment
Spatial steps	Whole ESPON national & regional analysis			
	National analysis of selected countries			
	Regional case studies			

The darker the shade of the field in the table the more promising the respective combination of spatial and analytical steps are. These different perspectives largely occur as of above stressed limits on data availability for the ESPON territory.

These different spatial and analytical steps should be kept in mind for the development of the methodology, which in the following largely differentiates between quantitative and qualitative approaches.

5.1 Research hypotheses

The following research hypotheses are related to the different analytical steps. Many hypotheses consider spatial disparities and their role and effect for the IS. This way, it is ensured that not only IS developments in advanced regions are considered but that also handicapped or other disadvantaged regions will be sufficiently reflected upon in the analysis as well:

- Though the IS can be characterised through a number of features, they will vary between different types of regions.

From this hypothesis follows, that it might be necessary to consider different regional characteristics for the different types of regions. For instance the relation between business and private use of modern ICT might significantly vary, depending of the regions' intensity of economic activities.

- Even within one or another type of region, the features can at least partly vary due to different niches of specialisation.

The second hypothesis especially follows theoretical considerations of different kinds of metropolitan regions, which with respect to their knowledge intensive service production are e.g. differentiated between *global cities* and *serve-industrial cities* (For such further metropolitan related differentiation see e.g. Kujath, H.J., 2005: Knoten im Netz).

- Backward, peripheral and other disadvantaged regions have lower chances to catch up and build up growth because important prerequisites like e.g. ICT networks are lacking.

This hypothesis is quite technical oriented and thus considers only the technical side of the IS. Nevertheless, it might be useful for a possible access to understand the lack of IS developments in such regions. Thus, it is a hypothesis which is impact related and from which – depending on the respective empirical findings – possible policy recommendations might be developed.

- Depending on the level of economic development, the regions in the different geographical parts of Europe are not equally affected by the spatial impacts of the IS. Centralisation - decentralisation tendencies vary.

This hypothesis can be used to found the selection of case studies, by including Western, Eastern, Northern and Southern European regions. As especially in the new member states numerous economic indicators point towards centralisation developments around a small number of MEGAs, it has to be asked, in how far this is also translated into the features of the IS, taking into account the society's developments beyond economic activities.

- While basically metropolitan regions are best prepared for the restructuring towards a knowledge based economy and information society, their success varies in dependence of the persistence of structures created in the industrial society and the ability for stimulating the restructuring processes. This also affects the strengths of ties between metropolitan regions and their hinterland.

This hypothesis depicts one possible relation between the core of the IS and economic impacts. In this context also policies could matter, if they influence the persistence of existing structures. It is also a hypothesis, which relates the metropolitan development of the IS to the micro level rather than the macro level as other hypotheses.

- It depends on the role of the state, whether it supports the creation of adequate prerequisites for the IS in a more centralised way or rather decentralize to foster an innovative environment also in disadvantaged regions.

Such a hypothesis is closely linked to the context dimension and assumes that the context dimension in different regions and countries can be more or less supportive for the development of an IS.

- The role of human capital of human capital and adequate and flexible education systems becomes increasingly important in an IS.

This hypothesis is based on the observation, that in highly advanced economies it becomes increasingly difficult for citizens with low educational attainment to participate in economic development. They suffer from foreign competitors and job losses. Thus, in order to achieve

an IS in which the majority of the population can participate and use modern information sources adequate education systems are needed in different types of regions.

The TPG aims at developing hypotheses which strengthen the relational analysis between the core knowledge-based economy and the surrounding elements of the IS. So far, only some of these elements are taken into consideration as to show, how such hypotheses could be developed.

Also above hypotheses need further elaboration. They especially have to be specified in accordance with data availability at different spatial levels. And they should be fine tuned for the process of the final case study design development.

5.2 Quantitative approaches of operational methodology

The different elements of quantitative methodological analysis envisaged for ESPON project 1.2.3 are developed along the analytical steps in Table 6. As far as possible, these steps are also put into relation with the respectively foreseen spatial coverage. However, depending on final data availability further methodological adjustments might be necessary.

5.2.1 Descriptive analysis

The descriptive analysis can be conducted on all three different spatial levels mentioned above. As of limited regional ESPON wide comparable data, however, the ESPON wide description is for many indicators likely to be limited to the national level.

In accordance with above common concept the descriptive analysis should be logically differentiated between the description of the knowledge-based economy and the frame of the KBE, which together form the IS. For structuring this analysis above indicator differentiation (see section 3.2) could be useful.

The description of the KBE should concentrate on selected economic sectors. These sectors include especially business services, high-tech services and industries as well as information and media industries. For the frame of the KBE (the different dimensions surrounding the core in Figure 2) it could be useful to further differentiate available indicators

and information between influences which are e.g. the result of the context dimension, effects related to policy interventions and impacts.

Depending on the availability of comparable data over time, the descriptive analysis should also indicate dynamics of the IS rather than only static data of one point of time. Also the combination of different indicators will certainly be useful for testing some of the research hypotheses. This also aims at later typology development. One starting point for such a multidimensional description could be the Lisbon theme of the RCE developed by ESPON project 3.1 and enhanced by project 2.4.2. In the further course of the project it shall also be tested, in how far the RCE methodology could be useful and further enhanced for the aim of ESPON project 1.2.3.

5.2.2 Impact analysis

Due to the limited comparable data availability for the whole ESPON space, quantitative impact analysis will have to be rather simple and will tend to be mostly used for the reviews of selected countries rather than for the whole ESPON territory. Therefore, the more qualitative approach of the case studies will be highly important for conducting the impact analysis of the IS.

In quantitative terms, above mentioned consideration of stock data at different points of time could represent a starting point for the impact analysis, which is also useful for below introduced spatial assessment. In addition, simple correlation analyses will be conducted for the data as far as available and comparable. This approach aims at determining the most important relations of different aspect of the IS, which can also support a focused case study design, possibly stressing different relations in different countries. The identification of such correlations can, furthermore, be helpful for later development of policy recommendations.

5.2.3 Spatial assessment

Beside the descriptive analysis and the analysis of spatial impacts of IS developments, these developments shall also be assessed against spatial objectives. This analytical step completes the impact analysis. For operationalisation reasons – at this stage of the project – this spatial assessment is foreseen for selected EU objectives only, thereby concentrating on spatial convergence, competitiveness, cooperation,

regional diversity and the polycentricity objective. Consequently, this assessment aims at mirroring the observed IS developments against ESDP objectives. This way it is analysed in how far the regions of the ESPON space move in terms of the IS towards one or another objectives and cohesion achievements of the IS are assessed.

5.3 Qualitative approaches of operational methodology – case studies

Qualitative method utilisation in ESPON project 1.2.3 aims at incorporating aspects of the IS, which could not be measured quantitatively for the whole ESPON territory on regional level. Especially because of the lack of comprehensive comparable data some seven case studies are envisaged.

As the analysis of selected countries forms the basis for case study selection and qualitative in depth analysis, this national analysis is also included separately in below case study outline, though it is also part of the quantitative approach.

5.3.1 Objectives of the case studies

The case studies aim at analyzing the role of the information society (IS) for strengthening territorial cohesion. Thus, different types of regions have to be considered, some of which might have benefited from IS-developments and others who possibly could not participate in IS-developments so far. This raises the following research questions (see Figure 3):

Q1: Why could some regions within one type of regions benefit while others are lagging behind in this respect?

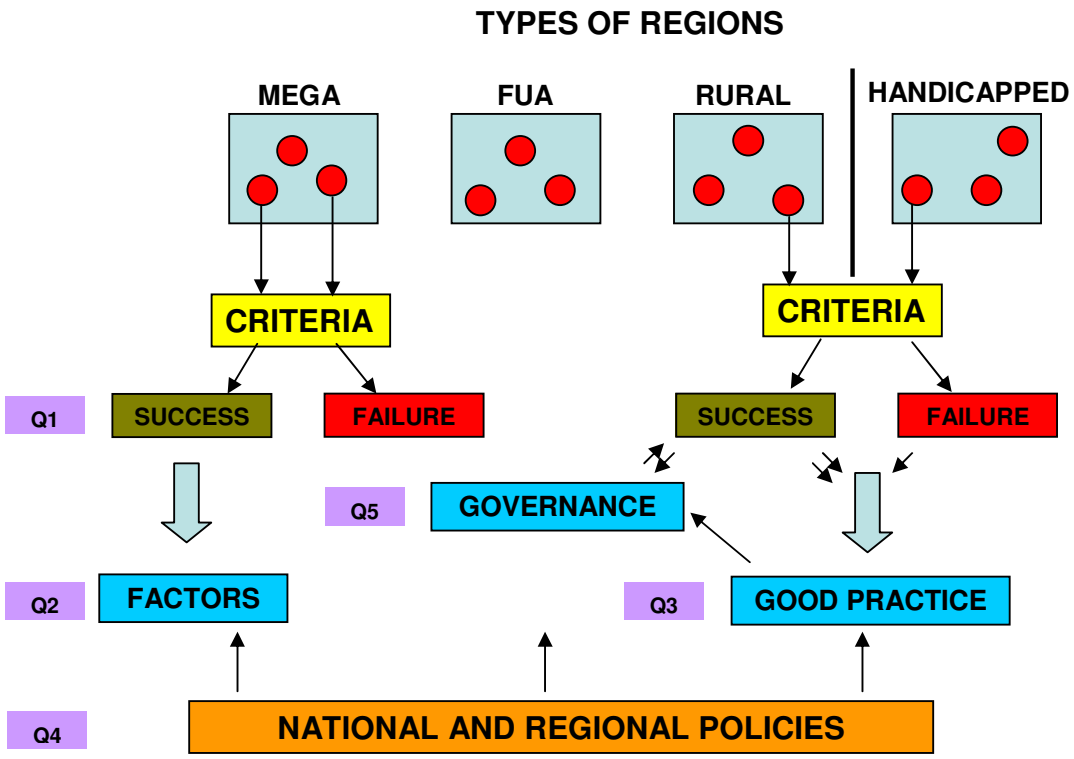
Q2: What are the factors for enhancing IS in MEGAs/FUAs?

Q3: How can the disadvantaged regions possibly participate in knowledge-based economy and building the IS (examples of good practice)?

Q4: What role do the national and/or regional policies play (IS, ICT, R&D)?

Q5: What role do governance play in catch-up process (refer to ESPON 2.3.2)?

Figure 3 Research questions



The research questions also aim at addressing these aspects of the IS which cannot be quantitatively measured on the regional level for the entire ESPON space. (e.g. household expenditure on ICT goods and services; immigration and emigration of skilled adults; exports of training and education services). Moreover, some indicators can only be represented by qualitative data (e.g. inter-organisational networks, financial & legal institutions, education system, governance structure…). Thus, relation of the case studies to the hypothesis "Changing role of state interventions goes beyond the mere supply of ICT but also includes the support to regional networking/cooperation structures and the knowledge about the opportunities created through ICT" gives an idea of possible scope of the case studies.

The case studies should verify the results obtained by a quantitative analysis performed for the whole European space and should supplement

them by additional findings, possible to obtain only through field research conducted on a limited territorial scale. The case studies should be conducted for a set of regions selected according to their representativeness for several types of regions, specified by earlier ESPON projects.

The new understanding of cohesion policy (Cohesion Policy…, COM (2005) 0299 Brussels, 05.07.2005) should be reflected in the design of the case studies (in fact, it had been applied into the initial proposal for this project, well before it became the official approach to cohesion). In particular, the case studies should provide answers on the impacts of particular dimension of the IS on competitiveness and growth potentials of particular types of regions.

5.3.2 Selection of case studies

The selection of regions and spatial coverage of the case studies is crucial to comply with the projects' needs, especially in the situation of quantitative data limitations. Different types of regions, which apparently participate to different extents and in different ways in IS developments, should be investigates. Several types of regions of special interest of the ESPON 1.2.3 project are indicated in the Terms of Reference and as such they need to be included in the research – the MEGAs, functional urban areas FUAs, rural regions and geographically handicapped regions.

Seven case studies are going to be conducted which will allow to take into account different types of regions and spatial trends (see Table 10). Number of the case studies, although corresponds with the Tender, is relatively limited. It is mainly due to their broad thematic scope and comprehensive spatial coverage envisaged.

Table 10 Proposed types of regional cases studies and their national location

	MEGA	**FUA**	**RURAL**	**HANDICAPPED**
EU "15"	Italy	Germany	Finland	Greece
NMS	Hungary	Czech	Poland	

5.3.3 Structure of case studies

Every case study will consist of two parts: 1. national, 2. regional (NUTS 3).

a) national level – research questions & approach (methodology)

The first part will be devoted to description of IS spatial trends within a given country. This part of analysis will be based on the set of common indicators within three categories: 1) ICT infrastructure and its use; 2) ICT sector & R&D & Education; and 3) purpose of use (based on the overview of data availability). Additionally every Partner will provide other relevant information on the IS development possible to collect in their own country (see Table 11).

Table 11 Examples of indicators to be further developed in the national contexts

Indicators
ICT infrastructure and use
Number of mobile (cellular) phones subscriptions per 100 inh.
Number of cable modem subscriptions per 100 inh.
Number of xDSL subscriptions per 100 inh.
Proportion of households with a computer
Proportion of households with internet access at home
Proportion of households with broadband internet access at home
Share of enterprises with internet access
Share of enterprises with own homepage
Share of enterprises receiving orders over Internet
ICT sector & R&D & Education
ICT sector employment, % of total (as defined by OECD)
ICT sector value added, % of total (as defined by OECD)
R&D expenditure
Private R&D expenditure
R&D personnel and researchers, % of work force
Number of patents
Proportion of population with completed secondary education
Proportion of population with completed tertiary education
Purpose of use: e-Government etc.
Percentage of population using the Internet for interacting with public authorities
Percentage of population having used the Internet in relation to training and educational purposes
Percentage of population using Internet to seek health information whether for themselves or others
Percentage of population having ordered/bought goods or services for private use over the Internet in the last three months

The second part will aim at analysis of policy documents related to IS development (e.g. strategies for ICT and R&D development, as well as other relevant document). Special attention will be focused on the main aims and objectives included in such documents, their spatial context as well as on implementation issues (see Table 12).

Table 12 Examples of strategies and other policy documents

Policy documents*
ICT related
The Strategy on the Development of the Information Society in Poland to year 2013 and Long-term Forecast of Information Society Transformation to year 2020, 2005 Action Plan for e-Government Development for the years 2005 – 2006 Proposed Directions of the Information Society Development in Poland to year 2020 ePoland - The Strategy on the Development of the Information Society in Poland for the years 2004-2006
R&D related
The Principles of the State Science, Technology and Innovation Policy to year 2020 The Strategy on the Increasing R&D Expenditure in order to achieve Principle of the Lisbon Strategy, 2004 Proposed Directions of Science and Technology Development in Poland to year 2020, 2004
Other relevant
National Development Plan National Strategy for Regional Development Sectoral Operational Programs

* example of Polish strategic policy documents

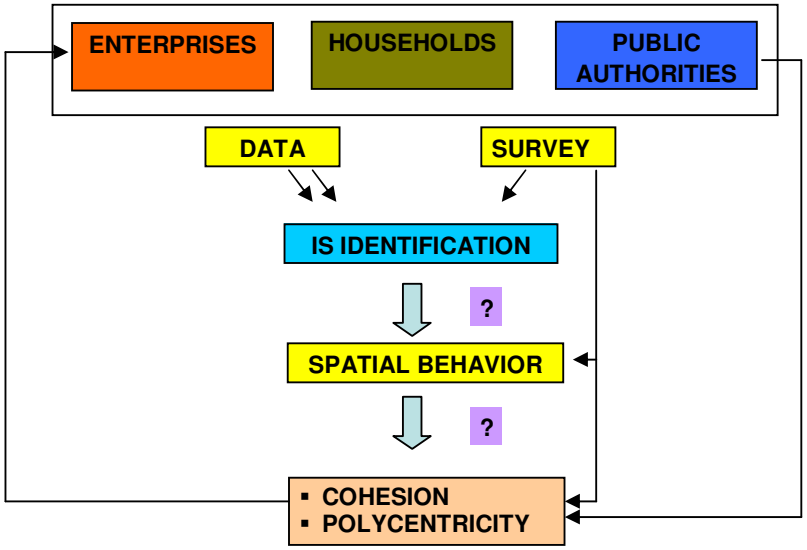
b) regional level – research questions & approach (methodology)

The objective of the analysis on the regional level is to investigate the role of information society for strengthening cohesion and polycentricity. This raises the following research questions on regional level:

1. What is the level of development in a given region? What kind of trends can be observed in the relation to the IS development across different sectors of this region: enterprises, households, public authorities?
2. Has the IS development influenced the spatial behaviour of the most important actors in these sectors?
3. Have the changes in the spatial behaviour influenced the levels of cohesion and polycentricity?
4. What kinds of activities were undertaken by regional and local policymakers to improve cohesion and policentricity with regard to IS in the region (bottom-up approach)?

The basic assumption underlying research to be undertaken on regional level is that the economy of each region consists of three main sectors: the enterprises, the households and the public authorities (see Figure 2). These sectors are strongly interrelated as a result of dense networks of goods', people's, capital's and information's flows. Furthermore each of these flows is characterised by specific spatial pattern. For instance enterprise might have unique organizational structure reflected in flows of capital as well as it might have different markets of supply and sales reflected in flows of goods and services.

Figure 4 Research question on regional level



The relations among three sectors mentioned are explained (see Table 13) with the use of different flows occurred. For example the spatial behaviour among enterprises and households might be described from the one side as flows between markets of production factors in the form of commuting and from the other side as flows of goods and services in the form of consumption.

Table 13 Types of spatial behaviour

	ENTERPRISES	HOUSEHOLDS	PUBLIC AUTHORITIES
ENTERPRISES	CAPITAL FLOWS TRADE	COMMUTING CONSUMPTION	SUPPLIES SERVICES
HOUSEHOLDS	COMMUTING CONSUMPTION	MIGRATIONS CONSUMPTION	COMMUTING SERVICES
PUBLIC AUTHORITIES	SUPPLIES SERVICES	COMMUTING SERVICES	COOPERATION COMPETITION

Therefore to provide answers for the questions raised above the following three surveys relating to these spatial behaviour patterns will be conducted:

1. enterprises (questionnaire and / or interviews),
2. households (school survey),
3. public authorities (questionnaire and / or interviews).

6 Next working steps

Several partners, including EUROREG, IRS and UJOE will attend the ESPON Seminar in Manchester (7-8 November 2005), when the ESPON project 1.2.3 will be presented for the first time within the session devoted to new lunged ESPON projects.

Next project meeting will take place on 12 December 2005 in Erkner (Germany). The discussion on the qualitative methodology as well as on case studies methodology will be the main points in the agenda. Moreover the views expressed during the Manchester seminar and the outcomes of MC first interim report evaluation will be taken into account when considering the details of the future working steps.

Additionally, as the financial report is going to be prepared for the period June - December 2005 the financial issues will be raised as well.

The next steps leading toward the Second Interim Report are related to the Case Study Template preparation. In order to have a whole TPG agreement on the structure and content of the cases studies the Template will be prepared by EUROREG (LP) and then it will be circulated among other Partners to have their opinion, comments and proposals. There will be as well the possibility for the discussion on that issue during the TPG meeting in December.

As case studies will consists of two parts, the initial research activities will concentrate on the national ones. The national reviews as basis for regional case studies will be carrying out at the same time as data collection. The national parts results of the case studies will be the starting points for surveys development.

Preliminary finings of the national parts of the cases studies as well as final selection of regional cases studies within countries and the surveys' structure and content envisaged will be included in the SIR.

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8 Appendix (in separate file)

ESPON

EUROPEAN SPATIAL PLANNING OBSERVATION NETWORK

ESPON project 1.2.3

Identification of Spatially Relevant Aspects of the Information Society

First Interim Report
October 2005

Appendix

Definitions of IS concept relating terms

Co-financed by the European Community through the Interreg III ESPON Programme

TERM	DEFINITION	INDICATORS	SOURCE
Information Society	There are 5 groups of definitions of the information society (see Webster 1995): Technical definition: Focuses on the diffusion of ICT, declining costs of ICT in relation to its capabilities, market volume of ICT and the share of ICT in the GDP. Economic definition: Focuses on the expansion of knowledge-based sectors within the economy. Employment-oriented definition: Focuses on the employment in knowledge-based sectors. Spatial definition: The information society is characterised by a marginalisation of space and time. Cultural definition: The information society is characterised by a steady growth in information available what causes a situation where every individual does not have the problem of scarcity of information but of an information-overflow. While most benchmarking studies focus on the first three definitions we should bear in mind the fourth definition as well, since spatial questions are much more important for regions than for countries.	System developed for Regions in the framework of BISER project: 5es Entity & identity Indicators Economy & Efficiency Indicators Equity & Cohesion Indicators Sustainability indicators e-technology (ICT infrastructure)	Webster F.,1995 BISER – Work Package 1: E-Europe Regions Development Model Report 2001, p36 BISER, Aalborg presentation Nov 2003

Information Society	The 'Information Society' has been characterized by: (1) ease of information access, (2) interaction richness, and (3) low interaction and information costs.		Kim B., Barua A., Whinston A.B., 2002, p. 215–231.
Information Society	The concept of the information society is the product of the convergence of several distinct forces in the 1990s. Conceptually, these include: rapid technological advances in the information technology sector; the widespread recognition that computers can be used to communicate information, not merely process it; the spread of simple, inexpensive and powerful computer networks; and an economic climate with risk tolerant capital willing to finance venture capital investments into technology based upstart companies.		Loebbecke C., Wareham J., 2003, p. 165-182.
Information Society	The information society can be regarded as a key word of the future at the present and it has become an object of both theoretical discussion and pragmatic programmes. The information society is seen to manifest itself in a variety of ways: in networks, in the economy, in technology, in expertise, content and action, in internationalisation and in the very idea of postmodernism. It comes natural to assume that essential discontinuity, radical change exists between the present and future. Enterprises are commonly perceived as the most important actors in the information society,		Vipera M. L., Nurmela J., 2001, p. 245-265.

	whereas governments seem to be losing their importance, and to remain merely as a guarantor of the conditions under which international businesses operate.		
Information Society	We are currently living in a transition period that can, notwithstanding all terminological and contextual debates, be called "the information society".		Webster S.,1995. Castells M., Oxford, 1996. Lacroix J., Tremblay G., 1997; p. 1–154.
Information Society	Information society is a component of the broader concept of post-industrial society.		Bell D., 1974. Stonier T., 1983. Touraine A., 1974.
Information Society	The information society is synonymous with what is meant by "new information and communication technologies" (ICT) and their usage. It includes number of aspects and fields of activities. At the moment the umbrella term for EU actions related to Information Society is eEurope.	There are 23 indicators. They include such items as: % of population who regularly use the internet % of households with internet access at home internet access costs Speed of	EU Glossary, www.europa.eu.int/information_society/eeurope Council Conclusions, 13493/00, LIMITE, ECO 338

		interconnections & services, etc For Full list see: Council Conclusions, 13493/00, LIMITE, ECO 338 According to them the EU wide benchmarking is made.	
Information Society	As many theorists have formulated, through different terms and varying concepts societal development in advanced industrial countries has led toward an information society, where the major driving forces are the development of information and communication technology, the rapidly increasing use of new devices, and the growth of the specific service sector. According to Castells (1996), the crucial technological turning point was the invention of microchips in the early 1970s. Since then, the core of information society was seen as consisting of technologies of information processing and communication—the logic of information technology was the basis of information society. Information and knowledge were simultaneously pivotal as production factors and as products. Thence, not just the role of information per se, but also its self-cumulativeness, productiveness, and creativity were central technological dimensions of		Ahlqvist T., 2005, 501–519

	information society.		
Learning Society	The concepts of the 'learning society', the 'learning organisation' and 'lifelong learning' have been regularly invoked to illustrate the centrality of 'learning' to the education–economy debate. In theory, this family of 'learning' concepts constitutes a visionary and challenging agenda. They affirm the value of placing learning, in all its forms and guises, at the heart of economic development. They denote the need to create a different type of society, which has the capacity to renew the democratic process, combat social exclusion, avoid further degradation of the environment and develop economically. Guile (2001) introduces the concept of 'reflexive learning' to illustrate the implications of reformulating public education policies to explicitly reflect the fact that learning is both a process of the acquisition of knowledge and skill and a process of participating in 'communities of practice'.		Guile D., 2001, p. 469–482.
Learning Economy	The theory of the learning economy has been developed by a group of Danish institutional and evolutionary economists engaged in the study of innovation (French S., 2000). At the heart of this theory is a belief that ``knowledge is the most fundamental resource in our contemporary economy and learning is the most important process'' (Lundvall and Johnson, 1994, p. 23). Learning economy theorists argue that the most significant form of competition is 'quality' rather than price-based		French S., 2000, 101-119. Lundvall, B.A., Johnson, B., 1994, p. 23-42. Morgan, K., 1997.. In: Asheim, B., Dunford, M. (Eds.),

	competition, especially within an economic environment where the rate of innovation is high (Morgan, 1997; Todtling, 1994). These theorists argue that the process of innovation is highly interactive and is dependent upon social and cultural institutions and conventions (Morgan, 1997, p. 493). The learning economy perspective stresses the importance of informal forms of knowledge, described by Lundvall and Johnson (1994) as 'know-how'. In a learning economy, innovation is understood as an interactive learning process, which is socially and territorially embedded and culturally and institutionally contextualized (Lundvall, 1992). It emphasizes a dynamic approach to innovation rather than the more static approach adopted in the knowledge-based economy that emphasizes access to a stock of specialised knowledge (Lundvall and Archibugi, 2001). Learning economies developed via collective learning are far more important than scale economies even in the chemical industry (Lieberman, 1984).		Regional Studies Special Issue: Regional Futures 31 p. 491-504. Todtling, F., In: Amin, A., Thrift, N. (Eds.), Globalisation, Institutions and Regional Development in Europe. Oxford University Press, Oxford 1994. Morgan, K., 1997, 491-504. Lundvall, B.-A. (Ed.), 1992. Lundvall, B-A., Archibugi, D. (Eds.), 2001. Lieberman M., 1984, p. 213–228.
Knowledge	That portion of the intangible economy engaged in the		European Union

based economy	production, distribution and use of knowledge.		BISER – Work Package 1: E-Europe Regions Development Model Report 2001, p38
Knowledge based economy	A knowledge-based economy is defined as one where knowledge (codified and tacit) is created, acquired, transmitted and used more effectively by enterprises, organisations, individuals and communities for greater economic and social development. It calls for: An economic and institutional regime that provides incentives for the efficient use of existing knowledge, for the creation of new knowledge, for the dismantling of obsolete activities and for the start-up of more efficient new ones. An educated and entrepreneurial population that can both create and use new knowledge. A dynamic information infrastructure that can facilitate effective communication, dissemination and processing of information. An efficient innovation system comprising firms, science and research centers, universities, think tanks, consultants and other organisations that can interact and tap into the growing stock of global knowledge; assimilate and adapt it to local needs; and use it to create new knowledge and technology.		OECD, 2001.
Knowledge-	"The knowledge based economy" is an expression coined to		OECD, 2005, para.

based economy	describe trends in advanced economies towards greater dependence on knowledge, information and high skill levels, and the increasing need for ready access to all of these by the business and public sectors. Knowledge and technology have become increasingly complex, raising the importance of links between firms and other organisations as a way to acquire specialised knowledge. A parallel economic development has been the growth of innovation in services in advanced economies.		71.
Knowledge economy	"In an economy where the only certainty is uncertainty, the one sure source of lasting competitive advantage is knowledge" (Nonaka, 1996, p. 18). The knowledge economy is a very different paradigm from previous agricultural, industrial, or service economies. It is one that rests on the value of human potential and how it might be systematically leveraged for the benefit of mankind. The challenge is to determine the integral linkage between human potential and economic performance (Amidon, 1999). Skyrme and Amidon (1997, p. 4) list four key factors, which have given rise to the concept 'knowledge economy': * Realization of the changing role of knowledge in society and business;		Nonaka, I., In: Starkey K. (ed.), *How Organizations Learn*, 1996, p. 18–31. Amidon, D., 1999 Skyrme D., Amidon D.,1997. Maskell, P., In: Baron, S., Schuller, T. (Eds.), Social Capital. Critical Perspectives. Oxford University Press, Oxford 1999, p.

	* Cost avoidance by reducing duplication of knowledge processes; * Knowledge leverage as a competitive enabler; and * Increasing appreciation of the value of intangibles, which is often reflected as intellectual capital in the share price of listed companies. Maskell (1999, 113) argues, ''a knowledge-based economy is materializing, where the competitive edge of many firms has shifted from static price competition towards dynamic improvement, favoring those who can create knowledge faster than their competitors''. It can see a wide range of assertions about the main features of 'knowledge economies'. It has been argued that they will be characterised by an 'informational mode of production' (Castells M., 1995), 'innovation-mediated production' (Florida R., 1995) and 'knowledge-creating companies' (Nonaka I., 1995). Furthermore, it has been asserted that people, rather than such traditional factors of production as capital, will become the main source of value and economic growth in this new type of capitalism, and that in future, more and more productive activities will make use of employees' intellect and creative capabilities (Florida R., 1995).		111–123. Castells M., 1995. Florida R., 1995; p. 527–36. Nonaka I., Takeuchi H., 1995. Contractor F.J., Lorange P., 2002, p. 485–502.

	An economy based on ideas rather than material objects has several distinct characteristics. An economy of objects emphasizes mass production, internalized ownership, control and vertical integration. An economy based on knowledge favors customization, flexibility, rapid response and dis-internalization or deconstruction of the value chain. This favors alliances, as different pieces of the value chain under different ownership cooperate with each other (Contractor F.J., Lorange P., 2002).		
Knowledge worker	Today's knowledge workers employ state-of-the-art technologies. At the same time, they fully recognize the hyper-speed with which one technique replaces another and how technology drives change (Cheryl J. Craig 2001). In general, a knowledge worker is said to be quasi-professional, educated to a high level and viewing work as a career with loyalty to the area of expertise rather than the employer (Drucker, 1969; Bentley, 1990; Runge, 1994). Young (1998) argues that the shift towards a 'knowledge economy' has problematicised the traditional link between qualifications and employment. He points out that		Cheryl J. Craig, 2001, p. 27–34, Baumol,W.J., 2002. Drucker, P. F., 1969. Bentley, T., 1990. Runge, L. D.,1994, p. 7-14.

	employers are no longer using qualifications to select individuals for fixed and routinised roles, nor for stable employment. In addition, given that 'knowledge economies' are characterised by increasingly fluid occupational structures, they are generating the need for new types and combinations of knowledge and skill. As a result, the acquisition of qualifications does not necessarily provide any guarantee that people have the type of capabilities which will be required in the future. Baumol (2002), for instance, claims that over 60% of the labor force in the United States are knowledge workers.		Young M., 1998.
Innovation	Innovation is understood as a new creation, which has economic significance by virtue of its adoption within organisations. There is a difference between process and product innovation. ICT may drive innovation in ALL sectors of economy, but innovation is not restricted to ICT. Innovation is considered essential for sustainable development, since it prevents from outdated economic structures.		BISER – Work Package 1: E-Europe Regions Development Model Report 2001, p.36
Innovation	Innovations are understood as new creations, which have economic significance by virtue of their adoption within organisations. There are process (technological or		OECD, Cities and Regions…, 2001. .

	organisational) and products innovations (goods or services)		
Innovative firm, technological products and process	A technological product and process innovating firm is one that has implemented technologically new or significantly technologically improved products or processes during the period under review.		OECD Glossary of Statistical terms http://cs3-hq.oecd.org/scripts/stats/glossary/index.htm Measuring the ICT Sector: Information Society, OECD, 2000, Defining the ICT Sector, page 7.
Innovation diffusion	Diffusion is the way in which technological product and process (TPP) innovations spread, through market or non-market channels, from their first worldwide implementation to different countries and regions and to different industries/markets and firms.		OECD Glossary of Statistical terms http://cs3-hq.oecd.org/scripts/stats/glossary/index.htm
Innovation activities	Technological product and process innovation activities are all those scientific, technological, organisational, financial and commercial steps which actually, or are intended to, lead to the implementation of new or improved products or processes. Some may be innovative in their own right, others are not novel but are necessary for implementation.		OECD Glossary of Statistical terms http://cs3-hq.oecd.org/scripts/stats/glossary/index.

	During a given period the innovation activities of a firm may be of three kinds: - Successful in leading up to the implementation of a new or technologically improved product or process. - Aborted before the implementation of a new or technologically improved product and process, because the project runs into difficulties or because the idea and know-how is sold or otherwise traded to another firm, or because the market has changed. - Ongoing, activities which are in progress but have not yet reached implementation.		htm OECD, Oslo Manual, Second Edition, December 1996, paras. 31, 34, page 10
E-learning	the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration."		The eLearning Action Plan: Designing tomorrow's education, 2001
E-government	E-Government is the use of information and communication technologies in public administrations - combined with organisational change and new skills - to improve public services and democratic processes and to strengthen support to public policies. E-Government is a way for public administrations to become: more open and transparent, and to reinforce democratic participation; more service-oriented, providing personalised and inclusive	The latest report on benchmarking E-government in EU provides detailed description of scope, technical sophistication and character of activities in 20 public services as indicators of E-governance. These are such	Online Availability on Public Services. How Europe is Progressing, April 2005, Capgemini http://europa.eu.int/information_society/

	services to each citizen; productive, delivering maximum value for taxpayers' money.	activities as: Income taxes Job search Social security benefits Car registration, etc.	
E-government	The term "e-government" focuses on the use of new information and communication technologies (ICTs) by governments as applied to the full range of government functions. In particular, the networking potential offered by the Internet and related technologies has the potential to transform the structures and operation of government.	Collected	OECD Glossary of Statistical terms http://cs3-hq.oecd.org/scripts/stats/glossary/index.htm E-government: Analysis Framework and Methodology, OECD Public Management Service, Public Management Committee, 2001.
E-inclusion	This term relates to process of facing the twofold challenge: to fully exploit the ICT potential to overcome traditional forms of exclusion, while ensuring that all citizens benefit from the Information Society.	Indicators could include: people who are disadvantaged due to limited resources or	http://europa.eu.int/information_society/soccul/eincl/index_en.htm

		education, age, gender, ethnicity... (eInclusion policies & activities) people with disabilities (e-Accessibility) and those living in less favoured areas (remote regions policies).	
E-health	e-Health refers to the use of modern information and communication technologies to meet needs of citizens, patients, healthcare professionals, healthcare providers, as well as policy makers."		http://europa.eu.int/information_society/eeurope/2005/all_about/ehealth/index_en.htm Ehealth Ministerial Declaration Brussels, 22 May 2003
E-work	The organisation and execution of work by actors in (partly or fully) virtual business communities. Alternatively, the term can also refer to specific new professions related to the internet and/or involving a high degree of ICT usage.		BISER – Work Package 1: E-Europe Regions Development Model Report 2001, p32
E-business	The term 'e-business' covers both e-commerce (buying and selling online) and the restructuring of business processes to	Indicators can be found in European E-	E-Europe: www.europa.eu.int/i

	make the best use of digital technologies.	business Report 2004 (mainly primary data – interviews)	nformation_society/ eeurope/2005/ http://www.ebusiness-watch.org/ www.europa.eu.int/comm/enterprise/ict/policy/watch/index.htm
E-commerce	Electronic commerce refers to commercial transactions occurring over open networks, such as the Internet. Both business-to-business and business-to-consumer transactions are included.	Measuring electronic commerce is difficult for a number of reasons including defining what constitutes electronic commerce, the speed of its growth and evolution and the fact that in many cases firms conduct both electronic commerce and traditional commerce simultaneously. Quantifying the value associated with electronic commerce activities can be	OECD Glossary of Statistical terms, http://cs3-hq.oecd.org/scripts/stats/glossary/index.htm

		challenging since many of its key qualities -- convenience, variety and ease of access to information -- are difficult to measure. This leads to a situation where it appears unlikely that official statistical offices will be able to provide accurate statistics on electronic commerce and quantitative insight into the nature of this activity will have to rely on private providers of data which suffer from a number of shortcomings, not the least of which is a transparent definition of what is meant by electronic commerce.	
E-money	Electronic money (e-money) is an electronic store of monetary value on a technical device that may be widely used for making payments to undertakings other than the issuer without necessarily involving bank accounts	Collected	OECD OECD Glossary of Statistical terms http://cs3-hq.oecd.org/scripts/

			stats/glossary/index.htm European Central Bank Annual Report, 2000, Glossary.
E-banking	Banking operations conducted using the internet.	Collected	OECD Glossary of Statistical terms http://cs3-hq.oecd.org/scripts/stats/glossary/index.htm
Human capital	Human capital is productive wealth embodied in labour, skills and knowledge.		Glossary of Environment Statistics, 1997.
Electronic/ internet transaction	An electronic transaction is the sale or purchase of goods or services, whether between businesses, households, individuals, governments, and other public or private organisations, conducted over computer-mediated networks. The goods and services are ordered over those networks, but the payment and the ultimate delivery of the good or service may be conducted on or off-line.		OECD Expert Group…, 2000.
ICT goods	ICT goods are those that are either intended to fulfill the function of information processing and communication by electronic means, including transmission and display, OR which use electronic processing to detect, measure and/or		OECD, 2003.

	record physical phenomena, or to control a physical process. ICT goods are defined by the OECD in terms of the United Nations Harmonised System. The guiding principle for the delineation of ICT goods is that such goods must either be intended to fulfill the function of information processing and communication by electronic means, including transmission and display, OR use electronic processing to detect, measure and/or record physical phenomena, or to control a physical process. Another guiding principle was to use existing classification systems in order to take advantage of existing data sets and therefore ensure the immediate use of the proposed standard. In this case, the underlying system is the Harmonized System (HS). The HS is the only commodity classification system used on a sufficiently wide basis to support international data comparison. A large number of countries use it to classify export and import of goods, and many countries use it (or a classification derived from or linked to it) to categorise domestic outputs. The application of the ICT product definition to selection of in-scope HS categories is a somewhat subjective exercise. The fact that the HS is not built on the basis of the functionality of products makes it much more difficult. The distinction between products which fulfill those functions and products that simply embody electronics but fundamentally fulfill other functions is not always obvious.		

	It is possible to adopt a narrow or broad interpretation of the guideline, though the OECD chose a broader interpretation, an approach which is consistent with that adopted to develop the ICT sector definition. ICT goods as defined by the OECD in terms of the HS are presented in the Annex to the paper referred to in the Source Publication.		
ICT sector	The Information, Communication Technology sector (ICT) is defined by the OECD in terms of the following ISIC Rev. 3.1 classes: Manufacturing 3000 – Office, accounting and computing machinery 3130 – Insulated wire and cable 3210 – Electronic valves and tubes and other electronic components 3220 – Television and radio transmitters and apparatus for line telephony and line telegraphy 3230 – Television and radio receivers, sound or video recording or reproducing apparatus, and associated goods 3312 – Instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process equipment 3313 – Industrial process equipment Services 5151 – Wholesale of computers, computer peripheral		OECD, 2003.

	equipment and software 5152 - Wholesale of electronic and telecommunications parts and equipment 6420 - Telecommunications 7123 - Renting of office machinery and equipment (including computers) 72 - Computer and related activities. The current OECD ICT sector definition was originally approved in 1998. It was ammended slightly in 2002 to reflect ISIC Rev. 3.1 changes to Wholesale.		
R&D	Research and development is a term covering three activities: basic research, applied research, and experimental development.		OECD, 1993, para. 58, page 13.