ESPON

KIT
Knowledge, Innovation, Territory

Applied Research 2013/1/13

Inception Report | Version 23/08/2010

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This report presents a more detailed overview of the analytical approach to be applied by the project. This Applied Research Project is conducted within the framework of the ESPON 2013 Programme, partly financed by the European Regional Development Fund.

The partnership behind the ESPON Programme consists of the EU Commission and the Member States of the EU27, plus Iceland, Liechtenstein, Norway and Switzerland. Each partner is represented in the ESPON Monitoring Committee.

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1. More detailed overview of the analytical approach to be applied

A general goal characterizes the KIT project: **to contribute to the understanding of the diffusion processes of innovation and knowledge in space**. To accomplish such a goal, the project is structured around five logical steps (and relative WP of activities):

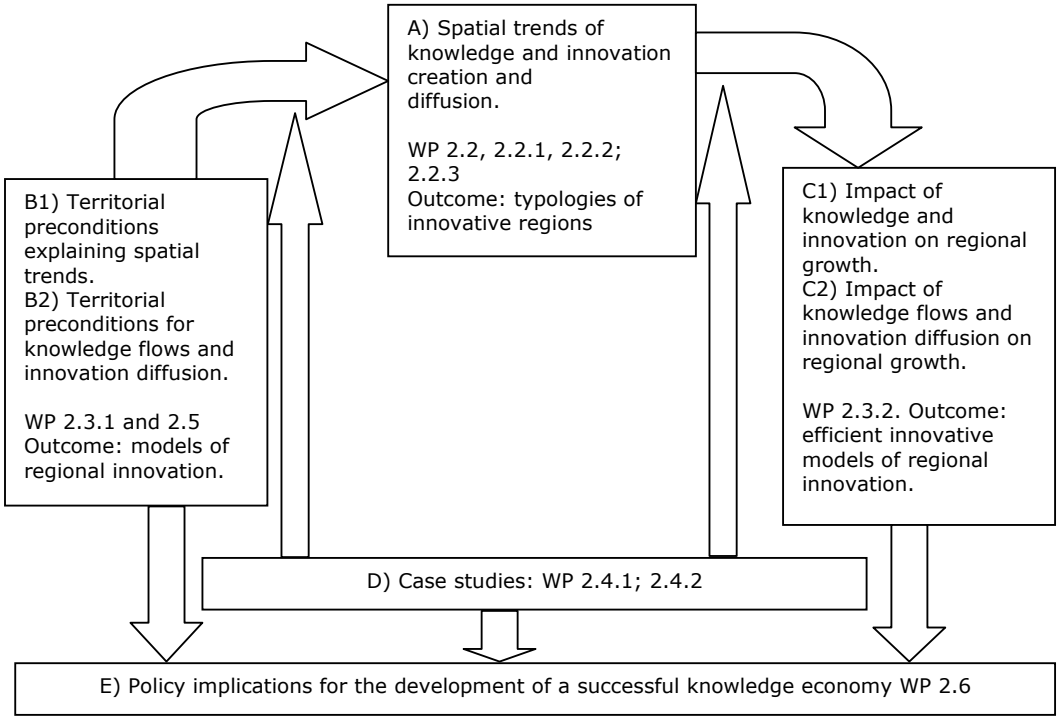
A) a first step deals with the identification of the **spatial trends of innovation and knowledge**, both endogenously created knowledge and knowledge flows coming from the regions (knowledge spillovers), based on a theoretical approach to the definition knowledge economy, which stresses the idea that knowledge economy is a multidimensional concept, based on different models of innovation creation and diffusion. An empirical analysis will be run with the aim to identify a first group of typologies of innovative regions: technologically advanced regions; scientific regions; innovative networking regions;
B) a second step deals with the **territorial potentials for innovation and knowledge creation**, with the aim to highlight, through a careful empirical analysis, the regional structural features that characterize each "model of regional innovation". In particular, this part is devoted to the identification of **territorial structural elements that can be attributed to each type of "regional model of innovation"**. The spatial trends of the innovation and knowledge economy are here linked to the territorial structure that characterize each region. A comparison with other regional knowledge economies in more advanced and emerging countries (US, China and India) is here proposed;
C) the third step is to **identify the efficiency of the different "models of regional innovation"**, by analyzing the impact of innovation and knowledge, both endogenous and externally obtained knowledge, on different regional economic performance indicators for each "models of regional innovation". Typologies of best performing "models of regional innovation" will be identified;
D) the fourth step is to analyze in depth both the territorial elements behind the spatial innovation and knowledge patterns and the impact of knowledge and innovations on regional growth through **case studies**, which carefully describe both best practices in terms of regional knowledge systems and the best spatial spillovers, and help understanding both the territorial successful elements of the knowledge economy and the impact of innovation and knowledge on regional growth;
E) the last and important step is to identify through all this rich quali-quantitative set of information, both descriptive and interpretative, ad-hoc **policy recommendations for the development of a successful knowledge economy at the regional level**.

The logic of the analysis is presented in Figure 1.

A) Spatial trends of innovation and knowledge

The first step is the identification of the spatial trends of innovation and knowledge. The definition of knowledge economy, of innovation, of knowledge creation is a fuzzy one, and calls for a clear conceptual approach on which to base a solid and logic empirical analysis, both quantitative and qualitative. Our conceptual approach rests on the idea that the *knowledge-based economy does not have a unique interpretative paradigm*, but can be defined on the basis of different approaches ranging from the earliest sectoral, through a more recent functional to the latest relation-based one. Each paradigm highlights important aspects of the knowledge economy; a clear conceptualization of the three paradigms and of their features allows to highlight the regional assets that are crucial for the creation of a regional knowledge economy. From the different interpretative paradigms also a different taxonomy of regions can be highlighted: a sectoral approach looks for technologically advanced regions; a functional approach for scientific regions; a relational approach for innovation networking regions.

Figure 1. Logic and structure of the project



On the basis of a critical review of the literature on regional innovation and knowledge, the TPG aims at developing the definition of different paradigms of the knowledge economy, and the identification of the regional assets to sustain knowledge creation and flows. This prepares the ground from a scientific point of view for the empirical analysis to be developed hereafter. A particular attention is devoted to the identification of territorial, industrial and firm's obstacles and drivers that can explain the spatial patterns of innovation and knowledge (WP2.1).

The conceptual approach opens the way to a descriptive analysis that will be carried out according to the three different approaches to the knowledge economy outlined above.

According to the ***sectoral approach*** to the knowledge economy, empirical evidence will be provided on the spatial trends of science-based sectors, high-tech sectors, product and process innovation at sectoral level (WP2.2.1). Spatial flows of innovation and knowledge due to the presence of science-based sectors, high-tech sectors and innovative firms in general in neighbouring regions will be calculated. Therefore, both the endogenous capacity of generating knowledge and innovation and the capacity of a region to attract flows of knowledge and innovation are empirically analysed.

A number of maps of Europe according to data availability (for some countries at NUTS1 or NUTS2) will be provided for each single type of innovation output and for complex indicators (see Section 2.2 data availability). A synthetic map showing **technologically-advanced nations and regions** will be provided. Maps of different kinds of innovation spillovers from the presence of nearby technologically advanced regions will also be provided.

Moreover, from data on regional sectoral employment, the **sectoral specialisation** and the **regional intensity** (density) of high-tech and medium-tech sectors will be calculated and mapped, indicating the **technologically advanced regions in Europe**. When this indicator is crossed with the presence of SMEs, clusters of high-tech SMEs can be identified at regional level. When it is crossed with the presence of large metropolitan areas, clusters of high-tech metropolitan regions can be identified.

According to the ***functional approach*** to the knowledge economy, empirical evidence will be provided on the spatial trends of innovative functions: R&D laboratories, universities, scientists, inventors and the spatial flows of innovation and knowledge that are generated by the presence of innovative functions in neighbouring regions (WP2.2.2). As it is the case for the sectoral approach, also in the functional approach the endogenous flows of knowledge and innovation are measured and mapped separately from the flows of knowledge and spillovers that come from outside the regions. The main purpose is therefore descriptive and it fulfils the crucial need of information on the **patterns of innovative activity across regions** along time. The presence of spatial cluster of common patterns of innovative activity will be also assessed by means of the usual spatial statistics, such as the Moran index and the Local Indicator of Spatial Association (LISA).

Moreover, a sectoral dimension can be added to this functional one by analysing the pattern of **specialisation and diversification of innovation at sectoral level across regions along time**. We will employ the usual indicators which are commonly used in the literature to give an adequate idea of the degree of specialisation and diversification in each region with respect to either the International Patent Classification (IPC) categories or the ISIC sectors which is more useful from an economic point of view since it can be related to other economic sectoral indicators. For the specialisation index we will use the Revealed Technological Advantage index whilst for the diversification index, several measures of variability will be proposed, going from the coefficient of variation to the Gini coefficient. The specialisation and the diversification patterns together with their spatial association will be measured **for different time periods** in order to assess their trends over time.

Tables and maps at the regional level (mainly NUTS2) will be developed with measures of the specialisation and diversification index for each region along different time periods. In this way, **scientific regions** in Europe will be identified. Maps of **spatial clusters of common patterns of sectoral specialisation in innovation** can be detected. Different time periods will be mapped so to detect if structural changes exist in spatial clusters of sectoral specialisation in innovation activities. Moreover tables and maps of spatial spillovers from scientific regions of these phenomena will also be provided. **Rankings of regions according to their scientific innovative performance** will be also developed.

According to the ***relational approach*** to the knowledge economy, empirical evidence will be provided on the spatial trends of innovation developed through networking among scientists and inventors, that allows most of the time a tacit transmission of knowledge (WP2.2.3).

In the age of modern technologies and the knowledge-based economy, in fact, the transmission of information, or codified knowledge, is increasingly important for the creation of innovations. However, the so-called tacit knowledge, which cannot be transferred into documentation such as papers, patents, and so on, plays an increasing role in the creation of new knowledge and valuable goods. Nonetheless, the only way of transferring this kind of knowledge is through frequent contacts and face-to-face interactions between individuals, such as scientists and inventors. Aside from merely market transactions and cooperative research projects as the mechanisms of knowledge transfer, knowledge spillovers have been highlighted as well. Indeed, knowledge spills over from the firm or institutions which afford R&D and human capital investments to other firms or institutions, both within a region or country or across countries. Among several mechanisms, the most notorious ones would be scientific literature diffusion and, therefore, patent citations, the quantity of face-to-face interactions and the quality of those contacts, or purely spin-offs. Besides, several scholars have stressed the importance of **highly-skilled labour mobility** in carrying knowledge embodied in them from one place to another. Thus, we will focus our analysis on the mobility of most skilled workers (i.e.inventors) and relationship among co-inventors.

As to the first, i.e. the mobility of most skilled workers, their movement is important since they are carriers of knowledge, not only codified knowledge, but also tacit, which actually cannot be transferred in almost any other way. The analysis of this phenomenon is intrinsically interesting from a policy viewpoint. Looking at their patterns of mobility and their effect on the

scientists' productivity and on potential positive (or negative) social externalities which spring up from their mobility, policy makers could design the most suitable framework to exploit this phenomenon for collective purposes.

As to the second, another source of tacit transferring of knowledge is through **cooperation among inventors**. The idea is to fully exploit the information contained in the patent database described above by building several matrices which are meant to provide different perspectives with respect to flows of knowledge across regions. In particular, we are going to produce three matrices concerning the relationships of co-inventors, of inventors with firms which apply for the patent and of inventors who cites other previous patents. We are going to assess the specific characteristics of these three network by using Social Network Analysis (SNA) techniques. This procedure allows us to investigate the presence (or not) of structural differences among relational networks and their dynamics across time. The analyses can be replicated for the most innovative sectors.

By applying a set of tools of exploratory analysis and spatial statistics, the objectives of the analysis of the mobility of inventors would be divided into two groups. On the one hand, **by describing and visualising through maps the distribution of highly-skilled scientists**, we would like to identify focus of attraction or expulsion (or "brain circulation") of talent among European regions. On the other hand, using the aforementioned ESDA tools, we would like to assess if there exist **some kind of spatial pattern in the distribution of this phenomenon through space** –particularly, whether there exist any significant spatial concentration of these phenomena, or whether their distributions across the space are characterized by any significant local regime at work. Basically, we are interested in elucidating why these moves could be concentrated in space – if they are; or what could be the relationship between geographical in- and out-flows of inventors in one area and that of its neighbours. As a speculative hypothesis, we should bear in mind that to the extent that production and specially innovation is concentrated, the movements of highly skilled personnel are expected to be concentrated as well, showing a subsample of regions an intense rate of inward and outward movements, which may well reflect, or may be a result, of their economic and technological particularities. At the same time, however, this concentration of moves could be a reason to explain why knowledge spillovers are bounded in space, and therefore this phenomenon feed also the former ones. Put differently, we hypothesize that knowledge spillovers are localized to the extent that, among other things, geographical mobility of those people more involved with innovation is also localized. In other words, after the influence of the amount of potentially moving inventors has on their mobility has been controlled for, we will address the role that space may play in the distribution of the mobility phenomena.

As to the relationships among co-inventors, tables and maps at the regional level (mainly NUTS2) with measures of average distance, density and centralisation of the matrices/networks referring **to co-inventors, inventors-applicants and citations**. Therefore, maps on the indicators of tacit knowledge flows will indicate which European regions are the so called **innovative networking regions**.

Additionally, a **comparative analysis of the territorial determinants of innovation in Europe, United States, China and India** will be performed in order to highlight **the different territorial determinants of innovation and knowledge creation in Europe and US, China and India** (WP2.5). In particular the geographical determinants of the differentiated innovative capabilities of these countries have remained unexplored notwithstanding their crucial relevance for the design of territorial-level policies able to support the EU effort to catch-up with the United States and keep a favourable position with respect to the new emerging actors. The comparison will be useful to focus upon the implication for the EU policies aimed at fostering innovation in particular as far as the Lisbon Agenda is concerned.

B) Territorial preconditions for knowledge creation and diffusion

The second step deals with the identification of the territorial preconditions that explain regional creation and diffusion of knowledge and innovation. The outcome of this effort will be the identification of regional models of innovation and knowledge creation (WP2.3.1).

With respect to the project presented, and on the basis of a more specific link between a theoretical and empirical approach required in the Annex III of the Subsidy Contract, a careful analysis has been envisaged on the way the **territorial dimension of the knowledge economy is explored.**

The main conceptual idea behind our empirical analysis is presented in Figure A.1a to Figure A.1f in Annex 1. A generalized "regional economic system *i*" gains competitive advantage from knowledge and innovation, when some steps are followed. First of all, new tacit and codified ideas have to be developed and created; once these ideas, in the form of knowledge, are inserted into a production process, innovation takes place, and, when adopted in an efficient way, economic efficiency is gained. Feedbacks, in the form of greater knowledge via innovation adoption, or human capital accumulation when economic efficiency increases, can easily be conceptualised, partly avoiding a simple conceptual linear model of innovation.

Our conceptual approach suggests that each step requires specific territorial pre-conditions (Figure A.1a in Annex 1). For knowledge creation, both tacit and codified knowledge, the territorial preconditions lie in education of the labour force and human capital in general, and also in an urban environment, a natural location for new ideas where demand is more inelastic (rigid) to prices, where "urban atmosphere" facilitates exchange of ideas, that find their natural seed. The transition from tacit knowledge to innovation requires the ability of local actors to manage information in order to identify and solve problems, or, more precisely in the economic sphere, the ability to transform information and inventions into innovation and productivity increases. In highly cooperative environments, the ability may come from collective learning processes, nourished by spatial proximity ("atmosphere" effects), network relations (long-distance, selective relationships), interaction, creativity and recombination capability. A collective learning process of this kind was first hypothesized by the GREMI group (Camagni, 1991) and subsequently widely adopted as a sound theoretical concept for the interpretation of knowledge-based development and innovation (Keeble and Wilkinson, 1999 and 2000; Capello 1999; Cappellin, 2003).

According to this approach, some areas are characterized by functional and hierarchical, economic and social interactions, that are facilitated by both geographical proximity (agglomeration economies, district economies) and cognitive proximity (shared behavioural codes, common culture, mutual trust and sense of belonging); both kinds of proximity allow knowledge flows to spread around, mainly through two main channels (Camagni and Capello, 2002):

- the huge mobility of professionals and skilled labour – between firms but internally to the local labour market defined by the district or the city, where this mobility is maximal), and
- the intense co-operative relations among local actors, and in particular customer-supplier relationships in production, design, research, and finally knowledge creation.

If this approach largely explains innovation through tacit knowledge, another stream of literature explains more directly the territorial channels through which codified knowledge spreads around. In the knowledge filter theory (Acs et al. 2004), the capability of a region to develop innovation stems from the degree of entrepreneurship present in the area. In fact, knowledge created by incumbent firms and research organizations such as universities will generate entrepreneurial opportunities because not all of the new knowledge will be pursued and commercialized by the incumbent firms. The knowledge filter refers to the extent that new knowledge remains not commercialized by the organization creating that knowledge. These residual ideas generate the opportunity for entrepreneurship, and the capacity of a region to turn local knowledge into innovation.

Once innovation is available in an area, the goals for which it is adopted may change; when best practice in terms of successful adoption and a supportive governance are present in the area, the probability of adopting innovation with efficiency goals, notwithstanding the high organizational costs involved, increases.

If all these territorial preconditions are present at the local level, a regional model of innovation that can be labelled **an endogenous local knowledge economy** is at work; all territorial pre-requisites exist and guarantee all steps from knowledge creation, to innovation adoption and the achievement of efficiency goals.

However, very different regional models of innovation exist in reality, based on locally missing territorial pre-conditions that might be replaced by interregional knowledge flows and innovation diffusion:

- a situation may exist when territorial preconditions for knowledge creation are absent, replaced by territorial preconditions, mainly spatial proximity, that allow inter-regional knowledge flows. When a region is geographically close to another region highly endowed of education, human capital and accessibility, knowledge might flow into the area from outside thanks to spatial proximity (Fig. 1.2b in Annex 1). In this case we might speak about **an endogenous local knowledge in a dynamic setting regional model of innovation**. In the real world, a natural innovative model of this kind is typical of industrial districts, generally missing an urban settlement structure that guarantees local urban externalities, accessibility to the outside world, human capital, and exploits these elements from nearby stronger urbanised areas;
- a different regional model of innovation is characterised by the presence of local knowledge, reinforced by exchange of knowledge with other regions, via scientific networks (in the case of tacit knowledge) or knowledge spillovers (in the case of codified networks). Social and cognitive proximities are in this case the territorial preconditions for these scientific linkages to occur. This innovative model is typical of global city regions, that thanks to their strong ties, reinforce their presence knowledge creation, and can be labelled **an endogenous local knowledge economy in a scientific network** (Figure A.1c in Annex 1);
- local innovation can be fed by external knowledge, when territorial receptivity is present, i.e. when the local economy is able to grasp knowledge, in the form of business ideas, from other regions and with that knowledge, able to achieve important product innovation at the local level. All agricultural areas in Tuscany in the wine production have innovated in the quality of the wine thanks to techniques learnt from wine areas in France (Figure A.1d in Annex 1). A regional model of innovation of this kind can be labelled "**an exogenously driven knowledge economy**";
- innovation can also be imitated from innovation developed somewhere else, giving rise to a fourth kind of regional model of innovation, namely "**a knowledge economy driven by exogenous innovation**". Areas in the world like Singapore and Korea are examples in this respect, and others might exist in Europe. The territorial preconditions for this kind of model of innovation is territorial attractiveness; the channels to achieve innovation locally is via FDI attraction, or in-migration of inventors (Figure A.1e in Annex 1);
- finally, **an integrated endogenous/networking knowledge economy** might be the case, when all territorial preconditions for both knowledge and innovation creation, from one side, and interregional knowledge flows and innovation diffusion, on the other, are present locally (Figure A.1A.1f in Annex 1). Some global city regions, those ranking first in the urban hierarchy, might be in this situation.

With this conceptual framework in mind, our idea is to highlight where the different regional models of innovations are located in Europe. Maps crossing the territorial elements that are determinants or necessary conditions for innovating and the different models of innovations will be produced.

c) Territorial impact of knowledge creation and innovation diffusion

The third step of our analysis is to interpret the **territorial impact of the knowledge economy** (WP 2.3.2). This interpretative analysis will be carried out for the different regional models of innovation that are conceptually highlighted and empirically identified.

In order to interpret the main impacts that the creation of a knowledge economy has on the economic performance of regions, four main analyses are covered under this WP:

- the impact of innovation on labour productivity, employment and GDP;
- the impact of innovation on the efficiency of the regional economic system;
- the measurement of the returns of innovation expenditures at regional level;
- the impact of mobility of inventors (tacit knowledge flows) on the capacity of regions to innovate.

The first analysis will concern mainly with **the impact of innovation on labour productivity, employment and GDP**. In line with **the sectoral approach**, at the regional aggregate level, the presence of innovation and knowledge creation can be measured in terms of increased productivity obtained through a sectoral reallocation of resources (the regional economy moves to higher-value added sectors); technological development in the existing sectors; functional upgrading. The analysis will measure the three effects that innovation can have at the regional level. Moreover, the analysis will assess the degree to which the different dimensions of innovation and knowledge creation act on GDP dynamics. In this case an interesting element that will be analysed is the impact of knowledge spillovers as compared to endogenous knowledge creation on GDP growth.

According to the **functional approach**, the second analysis will focus on **the impact of innovation on the efficiency of the regional economic system**. The main aim is to analyse the level of technical efficiency of each European region using non parametric methodologies. More specifically the effects on the regional output levels of innovation and knowledge (technological and human capital) will be assessed, controlling also for other inputs (physical capital, labour units, social capital, infrastructure etc). We will employ the DEA (Data Envelopment Analysis) formalised by Charnes et al (1978) from the original contribution by Farrell (1957) and also the Full Disposable Hull (FDH) proposed by Deprins et al (1984). As a robustness check, the analysis can be replaced with a different methodology, by estimating a spatial Cobb-Douglas production function including innovation and knowledge inputs as well as traditional inputs and assessing whether different regional models of innovation exhibit different elasticities.

According to the **functional approach** as well, the third analysis will be on **the measurement to the returns of innovation expenditures.** The returns to R&D expenditures on the innovative capacity of a region can be usefully analysed within the context of a knowledge production function (Griliches, 1979). This analysis allows also to assess the characteristics of the spatial technological spillovers (effective spatial distance, role of national borders, contiguity, cluster of technological similar regions). The relationship between innovative output (patents) and innovative input (R&D expenditures and researchers) will be controlled by including other economic and institutional variables which characterise the regional environment (factors endowments, public infrastructures, productive specialisation, etc).

According to the **relational approach**, the fourth analysis will look at **the impact of mobility of inventors (tacit knowledge flows) on the capacity of regions to innovate**. Inventors' mobility is a source of knowledge transfer between firms, and the inventors themselves are sources of human capital externalities, because when these people move, they bring their knowledge to other places and share it with their new colleagues, acquire also new knowledge from them, and, in general, promote combinations of knowledge which lead to even more and better knowledge. Therefore, their moves are critical for the regional creation of knowledge. On the other hand, networks of research collaboration and co-inventorship are seen to be another important knowledge flow and creation mechanism among researchers.

All in all, different outputs will be obtained, that prepare the ground for regional policies aimed at the development of the knowledge economy. All this allows to identify:

- the performance of European types of territories thanks to the presence of innovation and knowledge;
- the performance of European types of territories from the perspective of innovation and knowledge;
- the return of investments in regional innovation and knowledge;
- the role of knowledge spillovers in the economic performance of regions.

D) Case studies

The quantitative results obtained on the basis of the empirical analysis through Europe will be corroborated by qualitative analyses on best practice. Two sets of **case studies** will be carried out (WP 2.4). The former will be on **knowledge creation** best practices to highlight the obstacles overcome and the elements that have favoured the development of the knowledge economy with a specific attention to the role of **governance** in innovation and knowledge exploitation and diffusion.

The latter will be on **best spillover mechanisms** to provide analysis of, and the measuring of technological spillover effects, by highlighting the channels through which knowledge has spread to another region, the elements that have induced technological spillovers to take place and the elements that have successfully supported technological knowledge diffusion. Detailed qualitative information on which type of proximity (organisational, geographical, cultural, social) is more useful in order to exploit knowledge and innovation spillovers will be created and added to the quantitative analysis in order to draw policy messages.

Section 2 of this report contains a careful analysis of the methodology for the case study selection.

E) Policy recommendations

The empirical results obtained above allow to stress the **policy recommendations** that can be put in place in order to strengthen territorial assets and territorial development strategies able to create value added for the innovation and knowledge economy (WP 2.6). Policy recommendations in this field are in line with one of the three priorities put forward by "Europe 2020" agenda, namely the achievement of a "smart growth" for Europe, intended as an economic growth based on knowledge and innovation.

In "EU20202" this priority does not call for a "one size fits all approach". Recommendations in this field have to be tailored on each "regional model of innovation", calling for specific policy interventions on those territorial preconditions that allow knowledge creation and innovation adoption, as well as those territorial preconditions that guarantee inter-regional flows of knowledge and innovation imitation. In this way, the best returns of innovation and knowledge investments to regional GDP growth are achieved.

2. Methodology and hypothesis for further investigation

The methodologies that will be applied are of four kinds:

- a group of descriptive methodologies, with the aim to show and to figure out the spatial patterns of innovation and knowledge; to characterize the territorial elements that accompany each spatial pattern and to identify territorial models of innovation;
- a group of interpretative methodologies (i.e. econometric exercises) to understand and interpret the spatial patterns of innovation and knowledge and their impacts on the performance of the regional economic systems;
- qualitative methodologies (i.e. case studies).

The **descriptive methodologies** will address blocks A, B and C of Figure 1. These include: elaboration of indicators for knowledge and innovation (sources of data: see section 3.2). In particular, Annex 2.1 contains the list of all descriptive methodologies that will be applied. All outputs of the descriptive analysis will be mapped.

The **interpretative methodologies** that will be applied in the project are mainly econometric estimates of knowledge production functions and regional growth models (Farrell, 1957; Griliches, 1979) and will address block C of Figure 1. General results for all regions in Europe are avoided, and instead **all interpretative results from the regression analyses will be highlighted for what concerns the different regional models of innovation indicated in the descriptive part**, through for example the use of dummies in the econometric models. The impact of innovation activities on the performance will be differentiated on the basis of different types of innovative regions. **All results of the impact analysis results will be mapped**.

The **qualitative methodologies** will be applied in the case study approach, which will be of two kinds:

Knowledge creation case studies: the case studies of this kind intend to discuss the development and determinants in terms of innovation and knowledge economy for some very successful areas. Beyond a broad analysis of pertinent indicators the TPG will discuss the historical background, determinants of successful development and relevant policy initiatives. As far as possible the analyses will reflect the regional situation and development against the background of other national regions. Beyond a general analysis of innovation performance the focus will be on drivers of innovation, carriers of innovation but also barriers to innovation.
Spillover case studies: direct survey research of an appropriate number and range of such identified spillover locales may be conducted inquiring about modes of spillover from informal to formal and focused on R&D, S&T, innovation, training, talent acquisition etc. and/or certain ambient features of spillover locations such as rent surfaces for office and industrial property, wage rates, house prices etc. may be used as local indicators of variance between comparable localities in terms of market demand. Knowledge economy identifiers are KIBS and high-tech employment concentrations at EU NUTS2 level as conducted by Cooke and De Laurentis, 2002; Cooke and Schwartz, 2008.

The case studies will be best practice examples of knowledge creation and knowledge spillovers in regions of the country of the partners assigned to WP2.4 - Italy, Slovakia and the United Kingdom. After careful consideration, the maximum number of interviews conducted per case study should be 10 interviews. If one location is used for both types of case studies then a maximum 15 interviews could be conducted at that location rather than 20 interviews.

The **case study selection methodology** will be a two step procedure. The first step allows to identify the location of the case study; the second step the best practice in terms of knowledge creation and knowledge spillovers. The **location of the case study** is based on the degree of productive specialization and the type of sector, traditional vs. advanced. Specialised vs. diversified areas are defined according to a regional location quotient of employment in NACE 2 disaggregated sectors. In Annex 2.2. different methodologies to identify advanced vs. traditional sectors are presented. Once the location of case studies is highlighted, **best practice on knowledge creation and spillovers have to be identified**. Especially for knowledge spillovers, two different methodologies are proposed in Annex 2.2.

The TPG will conduct 12 case studies, 6 on knowledge spillovers and 6 on knowledge creation. Structured interviews on a questionnaire will be addressed to firms with the following main questions:

- in the development of the company, how was knowledge produced, obtained and used?
- what was the role of individuals and networks of experts in this process?
- what was the role of external and internal environment on the company?
- how the spillovers are influenced and differ in selected matrix circumstances? What is

or could be the best practice to support such a spillovers?

Moreover, interviews will be run to several institutions (public and private) engaged in innovation support governance.

3. Review of the main literature and data sources

3.1. Review of the main literature

In the Green Paper of the Territorial Cohesion and on the European Research Area, the European Commission has called for a particular attention at the **territorial dimension of innovation and knowledge creation**. The diversity of innovation activities, of the spatial diffusion of innovation throughout the European territory, of the capacity of regions to create knowledge and to exploit knowledge coming from outside calls for an in-depth analysis of the territorial dimension of the knowledge economy, on which the so called "**third generation of innovation policy at Community level"** can rely. As Danuta Hübner (2009) claims (p. 2): "Innovation policy at community level is now moving into its third generation. It is moving away from the approach of the first generation of innovation policy which focused on R&D through a linear process for the development of innovations, beginning with laboratory science moving through successive stages up to the inclusion of knowledge in commercial applications. Equally, it is building on the approach of the second generation which recognised the complexity of innovation systems (national, regional, local, sectoral), with many feedback loops between the different stages. In the approach of **this third generation**, innovation is not considered as a linear process that starts with research, eventually leading to development, translated later into growth in the territories that have more capabilities. Instead, it is the product of a policy mix, including several bodies and stakeholders in which **the territories, their specificities and conditions are paramount**" (Hübner, 2009; p. 2).

Although early use of the term knowledge-economy goes back to the work of Fritz Machlup (Machlup, 1962), only in recent years has the concept of the knowledge-based economy begun to spread in the scientific and political literature. This is, mainly due to work sponsored by the OECD (David and Foray, 1995; Foray and Lundvall, 1996). The European Union set itself the goal in 2000 of becoming the most competitive and dynamic knowledge-based economy in the world. It subsequently confirmed that goal in 2005, submitting its Structural Fund resources to achieve it.

If we want to adopt a historical approach to the interpretation of the concept, sector-based definitions and function-based definitions were successively proposed and held for long times. While human capital has always been considered as a basic condition for any knowledge-based development, different factors were indicated as the driving forces of change. In an early stage, that can be located in the late 1970s and 1980s, most attention was directed to "science-based" (Pavitt, 1984) or high-technology sectors; regions hosting these sectors were considered as "advanced" regions leading the transformation of the economy. New jobs were expected mainly from these new sectors, while more traditional sectors were expected to restructure or even to flow off-shore, giving rise to serious tensions in the local labour markets.

It soon became evident that the dichotomy was too simplistic, and that many knowledge-based advances were possible and were actually introduced by "traditional" sectors – such as textiles and car production - in their path towards rejuvenation. Furthermore, complexification of technological filières inside the value chain increasingly underlined the relevance of advanced tertiary sectors. These supplied producer services mainly in the form of consultancy for process innovation (proper acquisition and use of advanced technologies, tailor-made software, systems integration in production, administration and logistic processes, organisational support) and for product innovation (marketing, design, testing, advertising, finance, distribution).

In the second stage which developed mainly during the 1980s and 1990s, a function-based approach was preferred (even though it overlapped conceptually with the previous one), which

stressed the importance of pervasive and horizontal functions like R&D and high education. "Scientific" regions, hosting large and well-known scientific institutions, were studied deeply and relationships between these institutions and the industrial fabric were analysed, with some disappointment as far as an expected but not often visible direct linkage was concerned (MacDonald, 1987; Massey et al. 1992; Monk et al., 1988; Storey and Tether, 1998). Indicators of R&D inputs (like public and private research investment and personnel) and increasingly indicators of R&D output (like patenting activities) were used in order to understand the engagement of firms and territories on knowledge, intended as a necessary long term precondition for continuing innovation (Dasgupta and Stiglitz, 1980; Antonelli, 1989; Griliches, 1990). This approach, equating knowledge and scientific research, was the one relaunched by the European strategy defined in the Lisbon Agenda.

It is difficult to escape the impression that both the sector-based and the function-based approaches to the knowledge-based economy, both driven by the need to measure and quantify, result in a simplified picture of the complex nature of knowledge creation and its relation to inventive and innovative capability. The presence of advanced sectors and advanced functions like R&D and higher education are special features of only some of the possible innovation paths and, though relevant, cannot be considered as necessary or sufficient preconditions for innovation. Furthermore, emphasising the stock of human capital, advanced functions and sectors may risk overlooking the interactive process between the different actors of knowledge development, which is increasingly seen as the crucial element in knowledge creation and evolution. This element is typical of production contexts characterized by the presence of SMEs but also of contexts where big firms develop their own internal knowledge, culture and know-how by enhancing internal interaction and boosting selective external interaction with industrial partners, schools, professionals and research centres. Therefore, a rather different approach should be utilised, a cognitive one, stressing the relational, cultural and psychological elements that define the preconditions for knowledge creation, development, transmission and diffusion.

The third stage of reflection, typical of the present in which a relation-based approach is preferred, concentrates on the identification of a "cognitive capability" (Foray, 2000): the ability to manage information in order to identify and solve problems, or, more precisely in the economic sphere, the ability to transform information and inventions into innovation and productivity increases, through co-operative or market interaction. The "learning" region is identified as the place where such cognitive processes play a crucial role, combining existing but dispersed know-how, interpretations of market needs, information flows with intellectual artifacts such as theories and models and allowing exchange of experiences and co-operation (Lundvall and Johnson,1994). Especially in contexts characterised by a plurality of agents – like cities or industrial districts - knowledge evolution "is not the result of individual efforts in R&D within individual firms, but rather the combination of complementary capacities and of widespread interactive learning processes, which involve many 'customers' and 'suppliers' along a well-defined filière or supply chain" (Cappellin, 2003, p. 307).

What is striking in all these approaches mentioned above is the central role played by **spatial elements** in creating new knowledge and in supporting inter-regional flows of knowledge, both evidenced by empirical analyses or deductively derived from theoretical elements. Each approach defines a type of innovative region; with a sector based approach, technologically advanced regions are highlighted; with a functional approach, scientific regions are evidenced, and with the relational approach, innovative networking regions are analysed.

All these kinds of region belong to a knowledge economy; they differ in terms of territorial elements that explain their innovative performance, as well as the spatial elements that support knowledge creation. A modern definition of knowledge economy should embrace all these "innovation models", taking into consideration that what is striking in all these approaches mentioned above is the central role played by **spatial elements** in creating new knowledge and in supporting inter-regional flows of knowledge, both evidenced by empirical analyses or deductively derived from theoretical elements, as we highlight in the next section.

3.2. Review of data sources

This project is a challenge from the point of view of the database on innovation and knowledge available and of its consistency for what concerns the geographical coverage required (NUTS2 or NUTS3 for the 31 ESPON countries[1]). The project requires a very strong effort in terms of data collection, and of elaboration of large empirical databases, because of the complexity of the theme and the wide geographical coverage required. However, the TPG already owns a solid database in this respect, and in some cases it already has the algorithms and the routines to build some missing data.

In order to complement the results of the project, data sources outside of ESPON will be used. We report below the results of the assessment of the data availability for the implementation of this project.

For what concerns data on **technological innovations**, the main source is the **Community Innovation Survey (CIS3, CIS4 and CIS 2006 waves).**[2] Regional innovation scoreboard will also be used and will complement CIS when necessary.

CIS data used in KIT rely on two datasets, one disaggregated at regional level, and one at micro level.

1)The macro-aggregated dataset covers 29 European countries in CIS3 and CIS4 (the 31 ESPON countries except Switzerland and Liechtenstein) and 30 in CIS2006 (the same as before plus Croatia) and provides information for core sectors aggregated into the 7 macro-sectors[3]. UK appears in the webpage but the information on most of the innovation items is missing. The country coverage at the macro level is much higher than at the micro level. However, in any case there is not any deeper geographical breakdown provided by CIS than the one at the NUT0 level.
Eurostat webpage for CIS provides information on the following indicators:

- Product and process innovation
- Innovation activity and expenditure
- Innovation co-operation in absolute value
- Public funding of innovation
- Other important strategic and organizational changes
- Organizational innovation

The coverage of countries for each indicator is given in the tables reported in annex (Table A.3.2.1, Table A.3.2.2a to Table A.3.2.2.h, Table A.3.2.3). In Annex 3.2.2 a methodology has been proposed to estimate regional data when national data are available is presented.

2) The micro dataset has been provided by the European Commission as a micro anonymized dataset at the firm level (only for CIS3 and CIS4) and contains 49761 firms belonging to 15 different European countries[4] in CIS3 and 104717 firms belonging to 16 different European countries[5] in CIS4.

The micro dataset will be used to develop an indicator of innovation diffusion/adoption, namely the number of adopting enterprises / Number of enterprises with process and/or product innovation or with ongoing or abandoned innovation activities[6]. This indicator is available for **26 countries** (Malta, United Kingdom, Iceland, Liechtenstein and Switzerland are missing)[7]

[1] Austria –AT-, Belgium –BE-, Bulgaria –BG-, Switzerland –CH-, Cyprus –CY-, Czech Republic –CZ-, Germany –DE-, Iceland –IS-, Denmark –DK-, Estonia –EE-, Spain –ES-, Finland –FI-, France –FR-, Greece –GR-, Hungary –HU-, Ireland –IE-, Italy –IT-, Lichtenstein –LI-, Lithuania –LT-, Luxemburg –LU-, Latvia –LV-, Malta –MT-, the Netherlands –NL-, Norway –NO-, Poland –PL-, Portugal –PT-, Romania –RO-, Sweden –SE-, Slovenia –SI-, Slovak Republic –SK-, United Kingdom –UK.
[2] Details on CIS are available in Annex 3.2.1
[3] Sectors list is presented in Annex 3.2.1.
[4] Bulgaria, Cyprus, Czech Republic, Estonia, Germany, Greece, Hungary, Iceland, Latvia, Lithuania, Norway, Portugal, Romania, Slovakia and Spain.
[5] Bulgaria, Cyprus, Czech Republic, Estonia, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Norway, Portugal, Romania, Slovakia, Slovenia and Spain.
[6] Details on the construct of this indicator are reported in Annex 3.2.3.
[7] For the countries of Malta, United Kingdom and Iceland, although the CIS survey was carried out in them, they

and provides information on innovation adoption rate / product innovation adoption rate / process innovation adoption rate according to CIS3 and CIS4 data **only at national level**. Tables A.3.2.4 and A.3.2.5 report the availability of the information for the three main indicators for CIS3 and CIS4.

For what concerns product, process and managerial innovation, some national and regional data are missing. The TPG will estimate the data starting from the national or NUTS1 data, by dividing the national data on the basis of the regional sectoral specialization and on the share of professions. For product innovation, the share of scientists will be used; for managerial innovation, the share of managers (as a proxy for managerial functions) will be used; for process innovation, both the percentage of managers and blue collar workers will be used.

Regional Innovation Scoreboard (RIS)
RIS dataset, as available at http://www.proinno-europe.eu/page/regional-innovation-scoreboard, lastly visited on 04/06/2010. The list of indicators available through the regional innovation scoreboard are presented in Annex 3.2.4.
RIS data are available for the following countries: BE, BG, CZ, DK, DE, EE, IE, GR, ES, FR, IT, CY, LV, LT, LU, HU, MT, NL, AT, PL, PT, RO, SI, SK, FI, SE, UK, NO. Details on regional breakdown availability and missing data is provided in Tables A.3.2.6 and A.3.2.7 for 2004 and 2006 respectively.
No data are currently available to the TPG for IS and for LI. Data for CH cover only the following indicators: Product and/or process innovators, New-to-market sales, New-to-firm sales, obtained thanks to the cooperation of Swiss ESPON Contact Point.

For what concerns data on **scientific innovation**, we rely on:

R&D expenditure[8]: Total intramural R&D expenditure (GERD) by region. Sources: Eurostat and Institut National de la Statistique et des Études Économiques (France).
NUTS2 2007 data available for Austria, Bulgaria, Cyprus, Czech Republic, Germany (except for DE22 and DE23, last data available for 1997), Denmark, Estonia, Finland, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania, Spain, Sweden, Slovenia, Slovak Republic, United Kingdom, Island, Norway;
NUTS2 2006 data available for France (except for FR91, FR92, FR93, FR94, NUTS 1 2006 data available);
NUTS2 2005 data available for Greece and Italy;
NUTS2 2003 data available for Netherland;
NUTS1 2007 data available for Belgium;
NUTS0 2004 data available for Switzerland;
Missing data for Liechtenstein.

R&D personnel[9]: Total R&D personnel and researchers by region. Source: Eurostat.
NUTS2 2007 data available for Austria, Bulgaria, Cyprus, Czech Republic, Germany (except for DE22 and DE23, NUTS1 2007 data available, and DE41 and DE42, NUTS2 2005 data available), Denmark, Estonia, Finland, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania, Spain, Sweden, Slovenia, Slovak Republic, United Kingdom, Island, Norway;
NUTS2 2005 data available for Italy;
NUTS2 2004 data available for France (except for FR91, FR92, FR93, FR94, NUTS 1 2004 data available);
NUTS2 2003 data available for Netherland;
NUTS1 2007 data available for Belgium;
NUTS1 2004 data available for Greece;
NUTS0 2004 data available for Switzerland;
Missing data for Liechtenstein.

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provide with missing information in the case of the questions we need to construct the innovation adoption indicator. As for the other two countries, they do not appear in the CIS webpage. One reason or the other prevents us from providing the indicator of innovation adoption in these 5 countries.

[8] See Tables A.3.2.8 and A.3.2.9 for details on data availability.

[9] See Tables A.3.2.8 and A.3.2.9 for details on data availability.

Patents[10]: number of patent applications filed to the EPO, regionalized according to the inventors' residence. Years: from 1980 to 2007. Source: CRENoS elaboration on OECD, REGPAT database, January 2010.
All data available at NUTS2 level.
For the list of available sectors for patents please refer to Table A.3.2.11 in the annex.

For what concerns data on **knowledge created through networking**, we rely on:

Citations made[11]: number of citations reported in patent applications filed to the EPO. Years: from 1980 to 2005. Source: CRENoS elaboration on OECD/EPO patent citations database, 2004 and OECD, REGPAT database, January 2010
All data available at NUTS2 level.
For the list of available sectors for patents please refer to Table A.3.2.11 in the annex.

Citations received[12]: number of citations for EPO patents and for patents of national offices of China, Japan and United States. All citations derive from EPO patents. Years: from 1980 to 2005. Source: CRENoS elaboration on OECD/EPO patent citations database, 2004 and OECD, REGPAT database, January 2010
All European data available at NUTS2 level. USA, Japan and China available at national level.
For the list of available sectors for patents please refer to Table A.3.2.11 on the annex

5th FP[13]: European financing for participants at 5th Framework Programme projects (1998-2002). In case of multiple participants a proportional quote was attribuited. Source: CRENoS elaboration on European Commission CORDIS (2002) Fifth framework programme.
All data available at NUTS2 level.

6th FP[14]: European financing for participants at 6th Framework Programme projects (2003-2007). In case of multiple participants a proportional quote was attribuited. Source: CRENoS elaboration on European Commission CORDIS (2007) Sixth framework programme
All data available at National level.

Mobility of inventors: we compute from the OECD-REGPAT database for each NUTS2 region the inventors inflows and outflows for all the **31 ESPON countries**, as the total number of inflows and outflows in the following periods: **1991-1995, 1996-2000 and 2001-2005**. Details on the methodology to build this indicator are reported in Annex 3.2.5.

For what concerns **social innovation**, the following indicators are available[15]:

- Broadband penetration, as proxy of ICT diffusion in the society, available from EUROSTAT for the years 2006-2009 at NUTS2 level; CH and LI data are missing.
- workforce in high-tech industries, as proxy of penetration and relevance of advanced technologies in regional economies, available from EUROSTAT, for the years 2006-2008 at NUTS1; LI data are missing[16].
- individuals who ordered goods or services, over the Internet, for private use, in the last year (e-comm), available from EUROSTAT for the years 2006-2009 at NUTS2 level; CH and LI data are missing.
- individuals regularly using the internet, as proxy of ICT penetration regardless the speed of connections, available from EUROSTAT for the years 2006-2009 at NUTS2 level; CH and LI data are missing.

[10] See Tables A.3.2.8 and A.3.2.10 for details on data availability.
[11] See Tables A.3.2.8 and A.3.2.10 for details on data availability.
[12] See Tables A.3.2.8 and A.3.2.10 for details on data availability.
[13] See Tables A.3.2.8 and A.3.2.10 for details on data availability.
[14] See Tables A.3.2.8 and A.3.2.10 for details on data availability.
[15] See Annex 3.2.6 for details on data availability.
[16] Eurostat provides a longer time series for this indicator but we will focus on the 2006-2008 series because of the large number of missing regional (i.e. NUTS2) data for previous series; the choice to focus on this sub-period is also consistent with the observation that the other indicators of social innovation are available for this time span only.

- human resources in Science and Technology (HRST), as % of economically active population, available from EUROSTAT for the years 2006-2008 at NUTS2 level; LI data are missing[17].

For what concerns **environmental innovation**, patent data in green technologies will be used.

For what concerns **economic, territorial and social data**, the dataset available is, at present, at NUTS2 level of 27 EU countries. It includes the following data:

Regional economic variables include:
- Regional GDP, regional employment in three sectors (agriculture, manufacturing, services), value added in three sectors (again agriculture, manufacturing, services). These data are available from 1995, but for many countries, especially for the New member states, the coverage is much shorter. Source: Eurostat.
- Regional employment and regional unemployment. These data are available from 1995, but for many countries, especially of the New member states, the coverage is much shorter. Source: Eurostat.
- Regional employment by NACE sector, coming from IGEAT matrix, it is available for year 2002 for 27 EU countries and cannot be made available for other periods or countries.
- Regional value added by NACE sector, coming from IGEAT matrix, it is available for years 1995, 2002 and 2004 for 27 EU countries and can not be made available for other periods or countries.
- Regional employment by function (ISCO), available in three year averages from 1996-98 to 2005-2007. It is available for 27 EU countries. Source: Eurostat LFS microdata.
- Regional infrastructure endowment, available from ESPON database and KTEN, for 27 Eu countries, generally for year 2000, sometimes for another year (e.g. 1995 or 2002).
- Structural funds expenditure: Total structural funds expenditure in the period 1994-1999. Also divided into 5 types of expenditure. Available for Old 15 member states from Espon Database.

Territorial and social regional data include:
- Regional population. These data are normally available from 1995, but for some countries the coverage is shorter. Source: Eurostat.
- Net immigration flows by three age classes (17-27 years, 32-42 years, 52-67 years), average in the period 1/1/95 – 1/1/00. Source: Espon.
- Regions with a Mega. Available from Espon database.
- Regional typologies (including settlement structure), available from ESPON database. We are waiting for the new ESPON typology project.
- Regional birth and mortality rates. Available from 1995, but for some countries the coverage is shorter. Source: Eurostat.
- Energy consumption. Share of energy toe (tons oil equivalent) on 100 inhabitants at NUTS0 1990-2002, source ESPON project 2.1.4. Estimations at NUTS2 level as reported in Capello et al., 2008.
- Energy price elasticity (% change in GDP due to 10% change in energy price), source: Espon 2.1.4 project.
- regionalized individual interviews on social, cultural, moral and religious values of European citizens. Source: European Values Study data. 1990 and 2000 waves are available, the 2009-2010 may be added subject to availability during the course of the project.

Other collectable data are:
- Land use, from Espon database.
- ISCED levels of education, available from EUROSTAT with relevant missing values. The International Standard Classification of Education (ISCED) was designed by UNESCO in the early 1970's to collect homogeneous statistics on education both within individual countries as well as internationally.
- New typologies as developed by current Espon typologies project.

[17] Eurostat provides a longer time series for this indicator but we will focus on the 2006-2008 series because of the large number of missing regional (i.e. NUTS2) data for previous series; the choice to focus on this sub-period is also consistent with the observation that the other indicators of social innovation are available for this time span only.

- People migration, available from Eurostat.

The current ESPON database (June 2007) contains data for 27 EU countries and sometimes 29 countries (27 EU + Switzerland and Norway). The new Espon database is still a work in progress.
In Eurostat some data have recently also been made available for Switzerland, Norway, Liechtenstein, Iceland and Turkey, though for these countries the number of missing values is normally larger with respect to the available data.
The enlargement to 31 countries of this database is subject to data availability put forward by the two major sources (Eurostat and ESPON database), including the four non-EU ESPON countries (Switzerland, Norway, Liechtenstein and Iceland).

Database for the comparative analysis between USA, China and India

For what concerns the comparative analysis between USA, China and India, data are available on the main regional structural elements. Data on patent intensity, R&D, Human Capital and 'Social Filter' conditions will be collected and processed for 'comparative' purposes covering US MSAs, Chinese provinces, Indian states.
In particular, for **China** data are available at the Provincial-level administrative subdivisions: 22 Provinces, 4 Autonomous Regions, 4 Municipalities. However the 2 Special Administrative Regions (Hong Kong and Macau) and 1 Autonomous Region (Tibet) will be excluded from the analysis due to the lack of data for the selected variables. For all provinces data will be provided as average over the period specified in Annex 3.2.8 and Table A.3.2.12.
For **India** data are available for 18 States and 3 Union Territories that will be covered by the analysis. For all States and territories data will be provided as average over the period specified in Annex 3.2.9 and Table A.3.2.13.
For the **USA** the analysis will be based upon 266 MSA/CMSAs18 covering all continental US States (and the District of Columbia), while MSAs in Alaska, Hawaii, or in other non mainland territories of the US are excluded from the analysis. Details on USA data are provided in Annex 3.2.10.
For both China and India data will be made available as an average over the 1994-2007 period. For the USA the majority for the variables at the MSA level are available for 1990 only (based on Census data) but attempts will be made in order to develop a panel data (see Section 8).
The specific methodology and conceptual categories used for the comparative analysis of **EU vs. US, China and India** at the territorial level can be based on the identification of 'regions' showing similar characteristics in terms of the relationship between indigenous innovative efforts (as proxied by R&D expenditure) and 'social filter' conditions (proxied by the Social Filter index). Details on this methodology are provided in Annex 3.2.11.

4. Use of existing ESPON results relevant for this project

The KIT project can take advantage of already existing results of other ESPON projects of the ESPON 2006 and ESPON 2013 Programme.

As to ESPON 2006, the following projects represent an useful background for KIT, namely project 1.2.3 ("Identification of spatially relevant aspects of the Information Society"), project 3.3 ("The territorial dimension of the Lisbon-Gothenburg Strategy"), project 3.4.1 ("Europe in the world") and project 3.4.2 ("Territorial impacts of EU economic policies and location of economic activities").

Project 1.2.3. analysed the spatial trends of diffusion and adoption of ICTs in European regions. Project 1.2.3. puts forward a strong link between the Knowledge-Based Economy (KBE) and the notion of Information Society (IS) and stresses their reciprocal influences and interdependencies. The interplay between the IS and the notion of KBE will be in the present project analyzed through the theoretical lens underpinned in WP2.1 and empirically

[18] The MSA/CMSA list is based on *Metropolitan Areas and Components, 1993, with FIPS Codes*, published by the Office of Management and Budget (1993).

investigated, with the use of IS data developed within ESPON project 1.2.3, adequately updated and improved, in WP2.3.2.

Project 3.3 most relevant findings point to a strong divide between Northern and Southern EU MSs in terms of Innovation and Research (as measured by a composite indicator); a rather strong orientation Europe-wide towards local economic relations as compared to transnational relations (as measured by a composite indicator); a core-periphery pattern in terms of economic sustainability and a East-West divide in terms of social sustainability (both measured by composite indicators). These indications represent a reference point in our analysis of the knowledge and innovation economy performance in European regions (WP2.2 and WP2.3.2).

Project 3.4.1 describes the position and the integration of the ESPON area in the World (and over time) according to a series of indicators, namely GDP per capita (and its trends) and trade, air, and migration flows. The indications coming out of the project are of relevance in our comparison of the knowledge and innovation economy performance in the ESPON area and in the US China and India (WP2.5). In terms of results mapping, this is of relevance too since the 3.4.1 project produced map templates for regions outside the ESPON area (WP2.5).

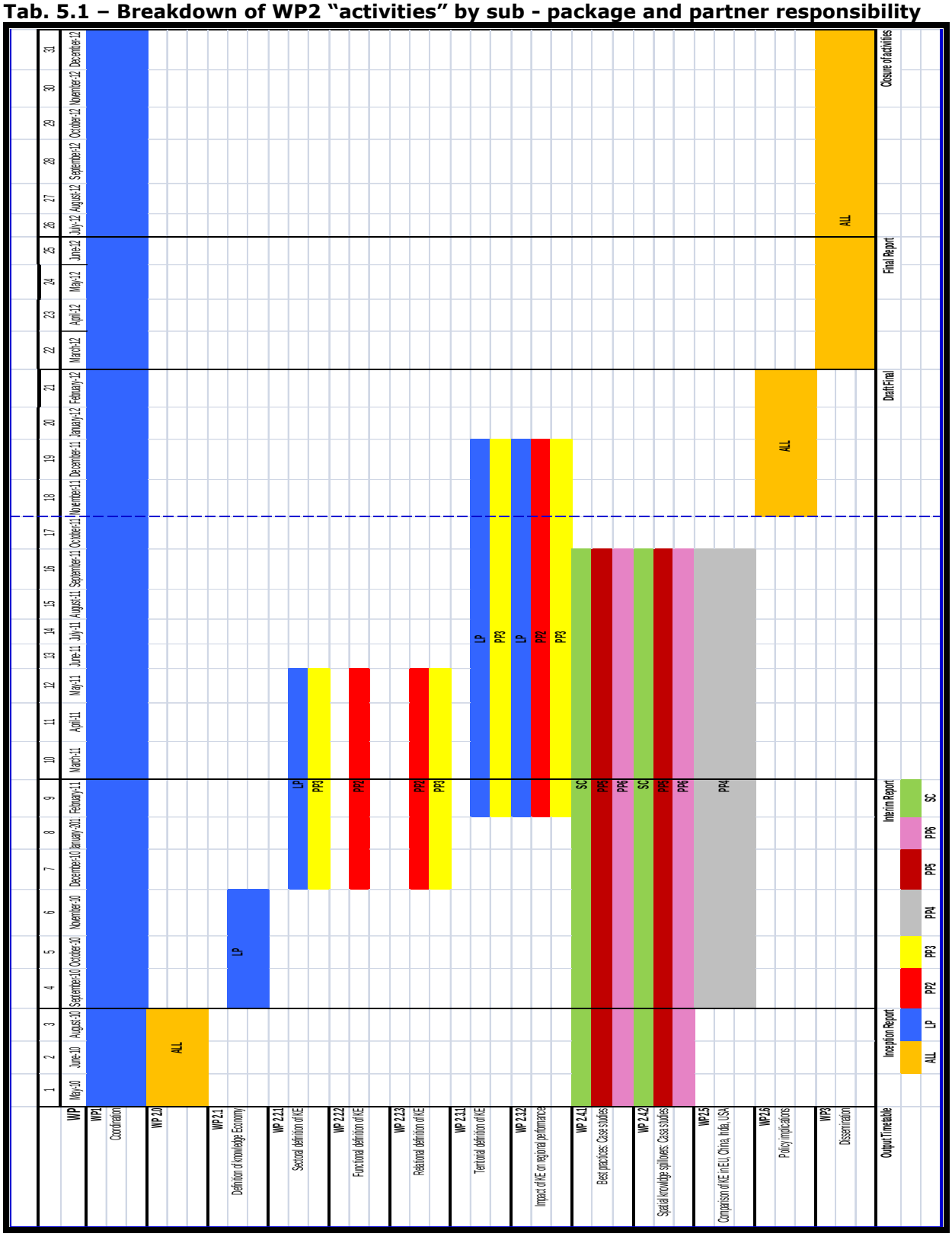
Project 3.4.2 stresses regional diversity as the crucial element characterising the ESPON area and identifies a list of key drivers of regional competitiveness, meant as productivity gain, which interestingly point to several dimension to be examined in the KIT project, such as human capital, creativity and innovation, economic diversification and specialisation. Therefore, the 3.4.2 project links quite directly to the hypothesis of the KIT project (WP2.1) discussed in Section 2.1.

As to ESPON 2013, the projects "TIGER" (which has recently started) and "Typology Compilation" (which is currently running) will provide as well interesting insights for the analysis; reference and comparison to their results will be developed during the project lifetime.

5. Distribution of work packages among partners and the breakdown of the project's budget on the individual partners per budget line

The logical, organizational and temporal structure of the research work is presented in Table 5.1. The division of labour among partners is straightforward. LP, PP2 and PP3 are in charge of the empirical analysis throughout Europe. PP4 is in charge of the comparative analysis with US, China and India; PP5, PP6 and a SC of the LP are in charge of the case studies.
In particular, the partners are assigned the following general tasks:
LP: coordination of the whole project, definition of knowledge economy, analysis of the sectoral dimension of innovation and knowledge creation (through sectoral/regional employment data), territorial analysis of endogenous determinants and flows of innovation and knowledge, regional impact of innovation and knowledge on productivity, employment and GDP growth, policy implications for the development of a regional knowledge economy, case studies (WP1, WP2.0, WP2.1, WP2.2.1, WP2.2.3, WP2.3.1, WP2.3.2, WP2.6).
PP2: analysis of the functional dimension of the knowledge economy (with the database on patents, patent citations, sectoral patents); analysis of the relational dimension of the knowledge economy through a database on FP; analysis of the impact of functional aspects of innovation and knowledge creation on regional total factor productivity (WP2.0, WP2.2.2, WP2.2.3, WP2.3.2, WP2.6).
PP3: analysis of the sectoral dimension of innovation at national level; analysis of the relational dimension of the knowledge economy (through data on mobility of inventors); analysis of the impact of mobility inventors on the innovation capacity of regions (WP2.0, WP2.2.1, WP2.2.3, WP2.3.1, WP2.3.2, WP2.6).
PP4: comparison between territorial determinants of regional knowledge economy in Europe and in the US, China and India (WP2.0, WP2.5, WP2.6).
PP5: case studies (WP2.0, WP2.4, WP2.6).
PP6: case studies (WP2.0, WP2.4, WP2.6).
SC of the LP: case studies (WP2.0, WP2.4, WP2.6).

Tab. 5.1 – Breakdown of WP2 "activities" by sub - package and partner responsibility



The breakdown of the project's budget on the individual partners per budget line is reported below in Table 5.2.

Table 5.2. Breakdown of the project's budget on the individual partners per budget line

	LP	PP2	PP3	PP4	PP5	PP6	TOTAL
Staff	200000	100000	116500	3600	31100	40000	491200
Administration (≤ 25% line 1 -staff)	50000	16000	6200	900	6220	5000	84320
Travel and Accomodation	10000	24000	15000	4500	5625	5000	64125
Equipment	-	5000	-	-	3500	-	8500
External expertise and services	50000	25000	2300	21000	3555	-	101855
TOTAL	310000	170000	140000	30000	50000	50000	750000

6. Project specific part

Annex III to the Subsidy Contract indicates that the following aspects should be taken into consideration and included in the Inception Report.

a) Further elaboration of the diverse dimensions of innovation
A way of including additional dimensions of innovation (namely, the social, environmental, cultural and educational dimensions of innovation) besides the technological one has been taken into consideration.
Section 3.2 of this report provides details on this aspect. In particular, as to social innovation detailed description of available indicators on information society are discussed in Section 3.2. As to environmental innovation, patent data in green technologies will be used as indicated in Section 3.2. As to cultural and educational innovation, several indicators on education phenomena are available to the TPG, as described in section 3.2.

b) Combination of scientific knowledge and practical policy actions
A step forward has been made with respect to the project by highlighting the conceptual way in which different regional models of innovation will be identified, and empirically evidenced. This step forward clearly envisages the link between the empirical part and the policy recommendations, since each regional model of innovation will require ad-hoc policy interventions. This is made evident in sec. 1 of this report.

c) Elaboration of the case studies
The procedure to select the case studies and the methodology to analyse them is described in Section 2. The TPG explored the possibility to enlarge the number of case studies to be developed and agreed to deliver 6 case studies as examples of best practises of regions that have been recently able to accelerate their performance in the innovation and knowledge economy, and 6 case studies as examples of technological spill-over effects.

d) Involvement of project partners
The research team includes some very experienced partners and their specific knowledge could be better exploited by the project. The reason for the involvement of partners as it was presented in the proposal, though, is that the involvement of three of the project partners is limited either to the implementation of case studies or the comparison between territorial determinants of the regional knowledge economy in Europe, the United States, China and India. In order to make the best possible use of the available knowledge base these project partners will act in addition as internal experts within the team and give their comments and input to the results elaborated by the rest of the TPG.

e) Data availability
Data availability is extensively discussed in Section 3.2. and Section 8 and related Annexes.

f) Links to other sources
Links to other ESPON results and data are detailed in Section 4, in particular ESPON Projects 1.2.3, 3.3, 3.4.1, 3.4.2, TIGER, and Typology of Regions.

g) Reflection on EU2020
The importance of the results of the study for EU2020 is made clearer in the policy recommendations of Section 1 in this report.

h) Timetable for deliveries
Timetable for project results delivery is detailed in Section 7, according to indications from Annex III to the Subsidy Contract.

7. Overview of more detailed deliveries and outputs envisaged by the project

The TPG will follow the timetable for delivering project results reported below:

- **28 February 2011 (Interim Report)**. The Interim Report will follow the ESPON template for Interim Report and will respond to the indications from ESPON CU and SB members on Inception Report. It will contain the first analyses of the spatial patterns of innovation, the selected case studies and the first results from them; the first comparative analyses with US, China and India.
- **28 February 2012 (Draft final Report)**. The Draft Final report will take into account feed-back on the Interim Report from ESPON CU, SB members as well as from ESPON seminars where the project's results will be presented. The Draft Final Report will also accomplish with the ESPON template for Draft Final Report.
- **30 June 2012 (Final Report)**. The Final Report will include the revisions of the Draft Final report on the basis of comments received.

Outputs from the projects will mainly concern:

- Spatial patterns of knowledge creation and interregional knowledge spillovers;
- Spatial patterns of innovation creation and interregional innovation diffusion;
- A map of the degree of regional technological innovation; of social innovation; of environmental innovation (when data problems are solved);
- A map of high-tech clusters in Europe;
- A typology of innovative regions: technologically-advanced regions, scientific regions, innovative networking regions;
- A typology of regional models of innovation;
- A typology of regional models of innovation according to the return from innovation on economic performance.

8. Indication of likely barriers that the project implementation might face

The major barrier to the project implementation relates to the integration of databases available to the TPG to cover the ESPON Space at the NUTS2 level. This will require to develop research strategies to deal with the likely large number of missing values.

Data regarding FP6 financing has not been regionalised yet. The database on FP6 financing lacks of a zip code for the participants and could be regionalised only once the information would be available. CRENoS has already contacted the CORDIS contact point to gather information on ZIP codes.

Data on R&D and Research personnel has been collected by Eurostat and the French *Institut National de la Statistique et des Études Économiques*, nevertheless there is often a lack of information on some NUTS2 territories and a missing value on Liechteinstein, which CRENoS will try to collect via data elaboration.

Data on green technology could be identified through IPC patent codes, but this methodology could be implemented only once the definition of *environmental innovation* has been completed. There will be a close collaboration between CRENoS and Politecnico di Milano to implement the definition on *environmental innovation*.

As to the comparative analysis between USA, China and India, the most relevant barriers are related to the collection of reliable and comparable data for the three different contexts (China, India and the US). In particular the following barriers have been identified so far:

a) R&D Expenditure Data:
    a. Data on Private R&D expenditure for India are not available from official sources. As a consequence we are exploring the possibility to develop a set of proxies based on firm-level data. This might prove problematic.
    b. Data on Central Government intra-mural R&D expenditure are also missing at the State level.
    c. Data on private R&D expenditure for the US – to be calculated from firm-level data available in Compustat – might not be available to cover a significant time-span (e.g. until 2007).
b) Data on other characteristics of the US MSAs for the year 2000 might not be available/comparable with data based on 1990 census.

As to case studies, the primary foreseeable barrier is the inability to gain access to the participants of the area that we select for the case study. While this is not an immediate concern due to the early stage of research for this project, it could become more prevalent during the interview stage of the research. To overcome this barrier, each research team working on the case studies will identify primary and secondary targets for the research. In the event that the primary target is not willing to participate in the research, after exhausting all possibilities, the secondary target will be approached. By widening the potential participant pool at this early stage, the research should not suffer any delays at later stages. Additionally, there might be difficulties to track spillovers outside the selected region.

9. Orientation of the project previewed towards the Interim report

A TPG meeting open to SB Members and ESPON CU is scheduled for the month of October 2010 or November 2010 at latest. The TPG will also participate to the ESPON Seminar to be held in Liege in November 2010.

The content of the Interim report will reflect the orientations given in the Inception Report as well as the results of the discussions that will take place with the SB. The report will include elements such as:

a) Main results on the basis of available data, developed indicators, typologies, and European maps, including:
- an overview on concepts and methodology on assessing the territorial dimension of the innovation and knowledge economy and possible final results;
- a detailed presentation of a hypothesis on the typologies and selections;
- description of the technique/methodology/indicators/models to be used to detect and approach the territorial dimension of the innovation and knowledge economy;
- preliminary results on the basis of available territorial indicators, including draft European maps;
- selection, further elaboration and preliminary results of the case studies;
- data collection achieved, including an overview on statistical and geographical data collected by EUROSTAT, the Joint Research Programme and national Statistical Institutes etc;
- outline of the conclusions and policy relevant options that could be the outcome of the project.

b) Plan for the applied research towards the draft Final Report as well as the Table of Content envisaged for the Final report.

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Annexes.

Annex 1. Charts of the different conceptual regional models of innovation

Figure A.1a. An endogenous local knowledge economy

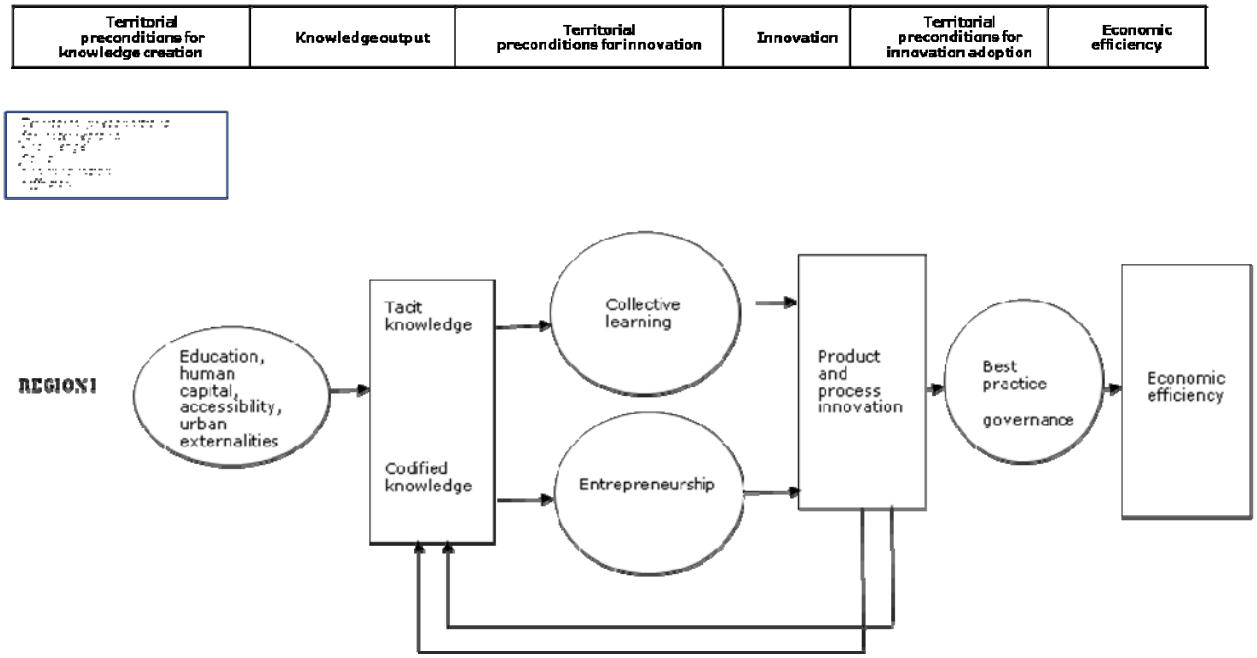


Figure A.1b. An endogenous local knowledge economy in a dynamic setting

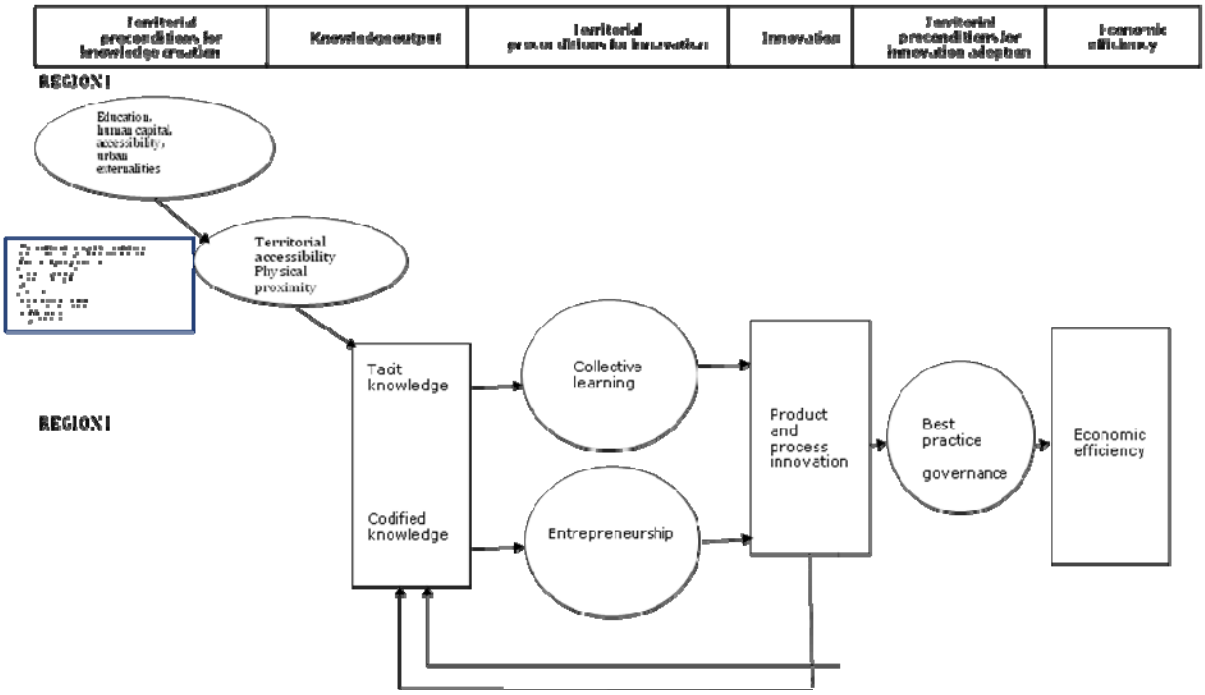


Figure A.1c. An endogenous local knowledge economy in a scientific network

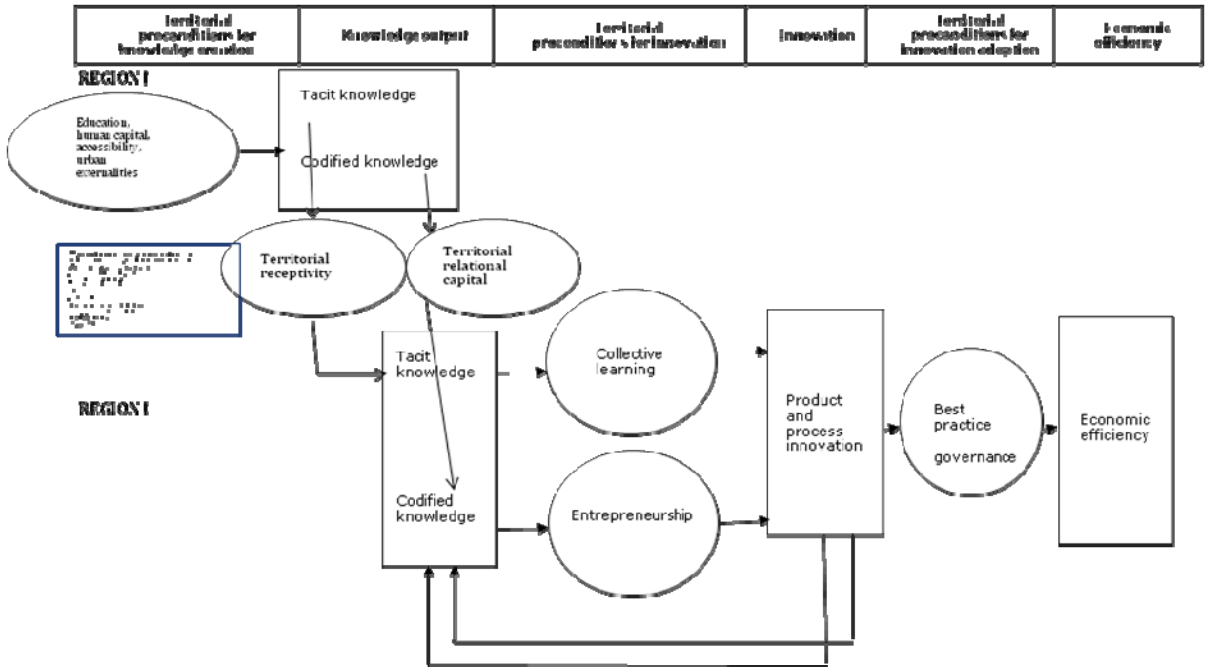


Figure A.1d. An exogenously driven knowledge economy

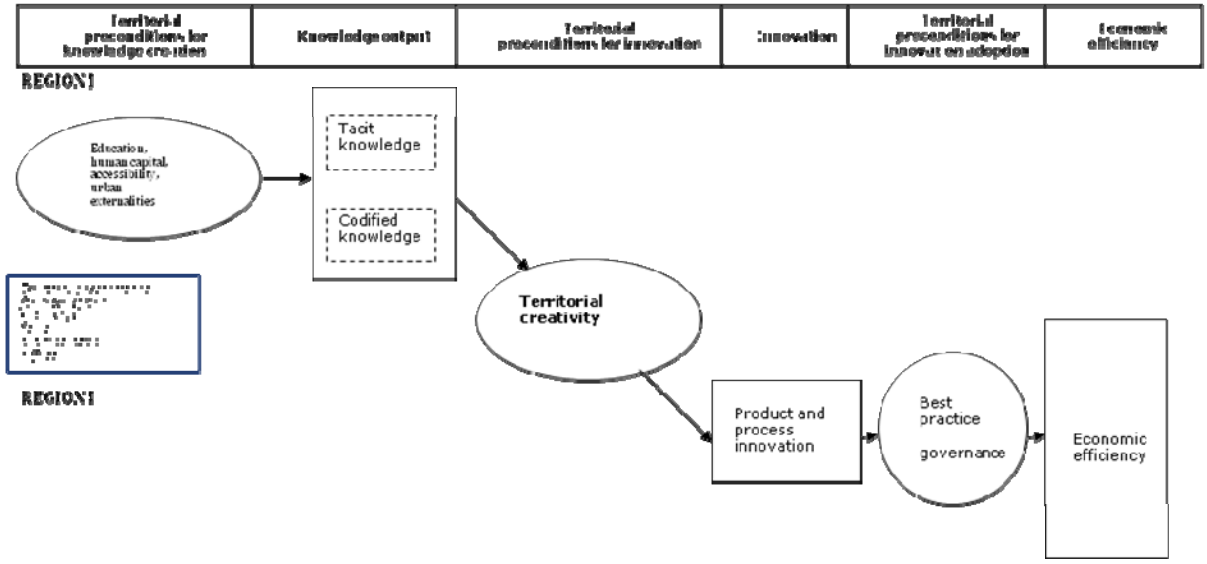


Figure A.1e. An knowledge economy driven by exogenous innovation

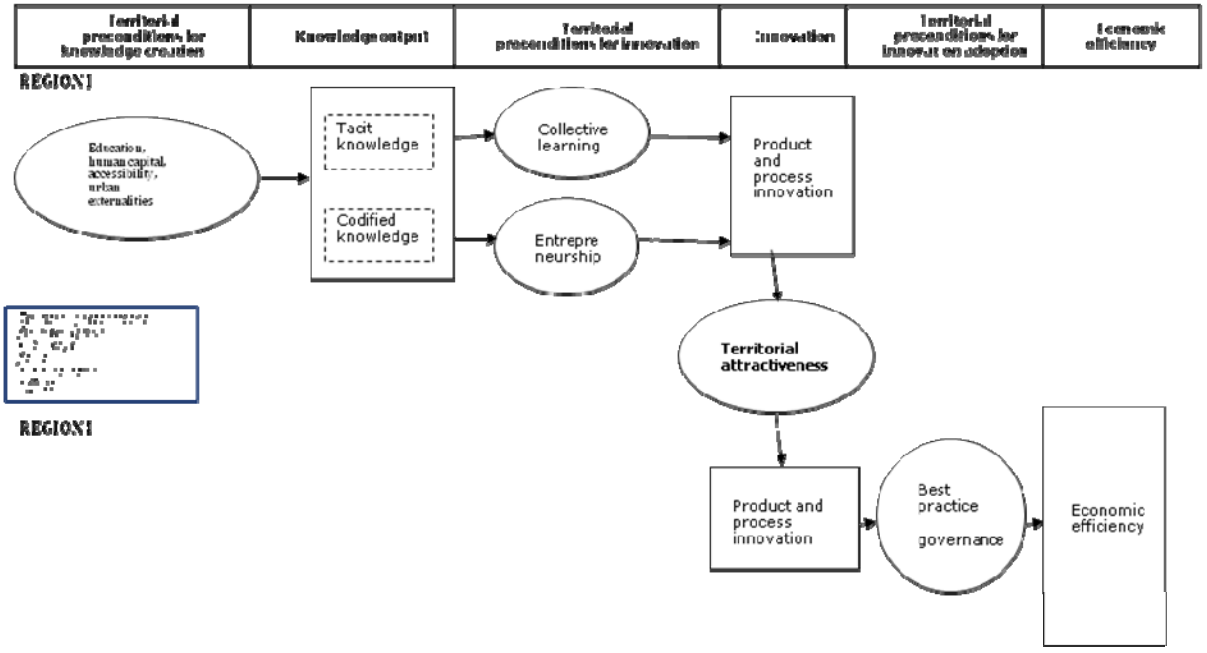
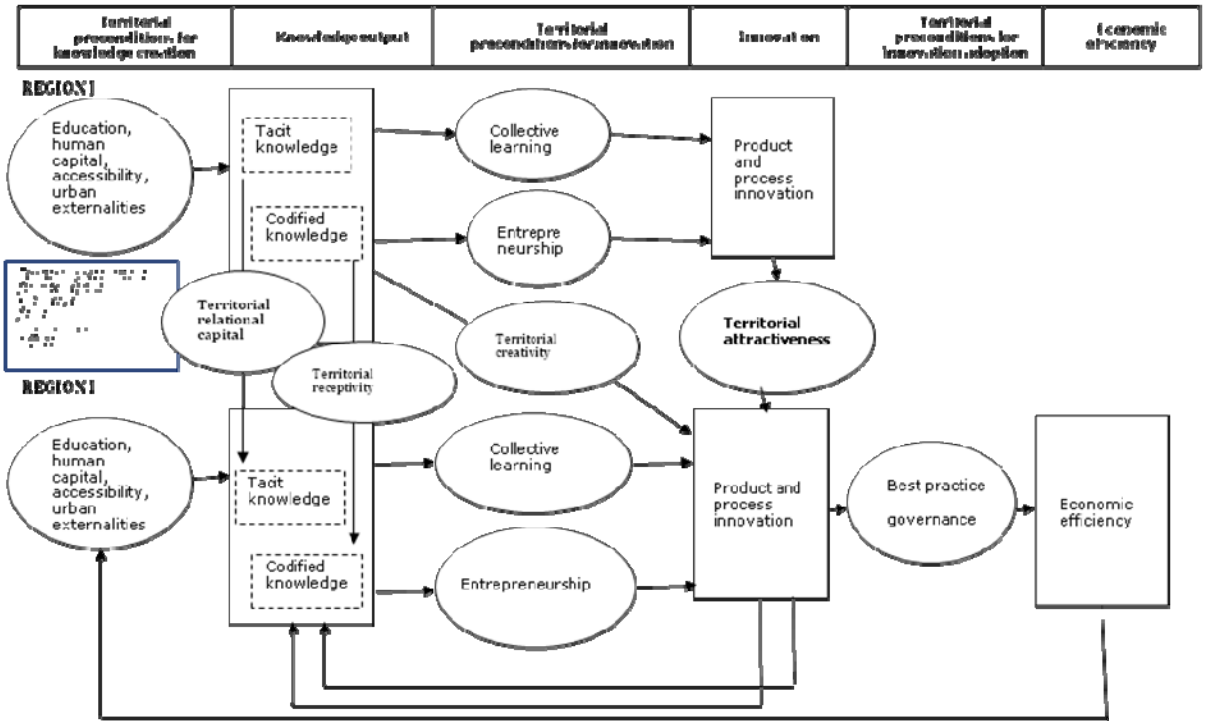


Figure A.1f. An "integrated" endogenous/networking knowledge economy



Annex 2.1. List of descriptive methodologies

The descriptive methodologies that will be applied concern:

- elaboration of indicators concerning technological innovation, in the form of product and process innovation;
- elaboration of indicators concerning social innovation, to highlight the digital divide among regions;
- elaboration of indicators concerning the dynamics of patent activities over time;
- elaboration of composite indicators for categories of innovation activities (i.e. one composite indicator for the presence of innovative functions in a region, like R&D laboratories, universities, patents, R&S expenditures, scientists), through a PCA (principal component analysis);
- mapping of both single and composite indicators at regional NUTS2 level;
- elaboration of spatial knowledge spillover indicators for each kind of innovation activities (like patents, R&D expenditure) and mapping of these indicators;
- a specialisation index (Revealed Technological Advantage index) of the spatial sectoral patterns of innovation and the identification of specialised innovation clusters in Europe;
- a diversification index of the spatial sectoral patterns of innovation, through several measures of variability, going from the coefficient of variation to the Gini coefficient.
- the presence of spatial cluster of common patterns of specialisation will be also assessed by means of spatial statistics, such as the Moran index and the Local Indicator of Spatial Association (LISA);
- social network analysis (SNA) techniques. This procedure allows to investigate the presence (or not) of structural differences among relational networks and their dynamics across time;
- statistical descriptive analyses like ANOVA and principal component analysis to highlight the statistically different territorial features of different types of innovative regions;
- statistical descriptive analyses like ANOVA and principal component analysis to highlight the statistically different territorial preconditions that accompany innovation and knowledge creation, and the territorial preconditions for interregional knowledge flows and innovation transfer, to identify the different territorial models of innovation;
- non parametric methodologies, like DEA (Data Envelopment Analysis) formalised by Charnes et al (1978) from the original contribution by Farrell (1957) and also the Full Disposable Hull (FDH) proposed by Deprins et al (1984), will be applied to highlight the relative efficiency of each region with respect to innovation output.
- gathering of qualitative information and elaboration of these information through case study methodologies.

A part from the last point (a case study methodologies) all other methodologies applied will allow us to have an output that can be reproduced on maps, as the tradition of ESPON requires.

Annex 2.2: Case study selection criteria in details

The **location of the case study** is based on the degree of productive specialization and the type of sector, traditional vs. advanced.

Specialised vs. diversified areas are defined according to a regional location quotient of employment in NACE 2 disaggregated sectors.

Advanced vs. traditional sectors are more difficult to highlight. The classification used by Eurostat and the OECD for identifying high-tech industry and knowledge-intensive services can be a useful starting point. In order to define high-technology industries and knowledge-intensive services both Eurostat and the OECD use the sectoral approach. The resulting

classification by industrial sector is an aggregation of manufacturing industries according to technological intensity (R&D expenditure/value added) and based on the Statistical Classification of Economic Activities in the European Community (NACE) at 2- or 3-digit level. Two different definitions, one according NACE Rev. 1.1 and one according NACE Rev. 2, are available and allow for compiling aggregates related to high-technology, medium high-technology, medium low-technology and low-technology. Services are mainly aggregated into knowledge-intensive services (KIS) and less knowledge-intensive services (LKIS) and defined according to a similar logic at NACE 2-digit level (see Table A.2.1). According to this classification we can select regions on the basis of their relative specialisation in high-tech or low-tech, knowledge intensive or less knowledge intensive activities.

Table A.2.1. 'High-technology' and 'knowledge based services' aggregations

Manufacturing industries	NACE Rev 1.1 codes	NACE Rev.2 codes – 3-digit level
High-technology	**24.4** Manufacture of pharmaceuticals, medicinal chemicals and botanical products; **30** Manufacture of office machinery and computers; **32** Manufacture of radio, television and communication equipment and apparatus; **33** Manufacture of medical, precision and optical instruments, watches and clocks; **35.3** Manufacture of aircraft and spacecraft	**21** Manufacture of basic pharmaceutical products and pharmaceutical preparations **26** Manufacture of computer, electronic and optical products **30.3** Manufacture of air and spacecraft and related machinery
Medium-high-technology	**24** Manufacture of chemicals and chemical product, **excluding 24.4** Manufacture of pharmaceuticals, medicinal chemicals and botanical products; **29** Manufacture of machinery and equipment n.e.c.; **31** Manufacture of electrical machinery and apparatus n.e.c.; **34** Manufacture of motor vehicles, trailers and semi-trailers; **35** Manufacture of other transport equipment, **excluding 35.1** Building and repairing of ships and boats **and excluding 35.3** Manufacture of aircraft and spacecraft.	**20** Manufacture of chemicals and chemical products **25.4** Manufacture of weapons and ammunition **27 to 29** Manufacture of electrical equipment, Manufacture of machinery and equipment n.e.c., Manufacture of motor vehicles, trailers and semi-trailers **30** Manufacture of other transport equipment **excluding 30.1** Building of ships and boats, and **excluding 30.3** Manufacture of air and spacecraft and related machinery **32.5** Manufacture of medical and dental instruments and supplies
Medium-low-technology	**23** Manufacture of coke, refined petroleum products and nuclear fuel; **25 to 28** Manufacture of rubber and plastic products; basic metals and fabricated metal products; other non-metallic mineral products; **35.1** Building and repairing of ships and boats.	**18.2** Reproduction of recorded media **19** Manufacture of coke and refined petroleum products **22 to 24** Manufacture of rubber and plastic products, Manufacture of other non-metallic mineral products, Manufacture of basic metals **25** Manufacture of fabricated metal products, except machinery and equipment **excluding 25.4** Manufacture of weapons and ammunition **30.1** Building of ships and boats **33** Repair and installation of machinery and equipment
Low-technology	**15 to 22** Manufacture of food products, beverages and tobacco; textiles and textile products; leather and leather	**10 to 17** Manufacture of food products, beverages, tobacco products, textiles, wearing apparel,

	products; wood and wood products; pulp, paper and paper products, publishing and printing; **36 to 37** Manufacturing n.e.c.	leather and related products, wood and of products of wood, paper and paper products **18** Printing and reproduction of recorded media **excluding 18.2** Reproduction of recorded media **31** Manufacture of furniture **32** Other manufacturing **excluding 32.5** Manufacture of medical and dental instruments and supplies
Knowledge based services		
	NACE Rev 1.1 codes	**NACE Rev.2 codes – 2-digit level**
Knowledge-intensive services (KIS)	**61** Water transport; **62** Air transport; **64** Post and telecommunications; **65 to 67** Financial intermediation; **70 to 74** Real estate, renting and business activities**;** **80** Education; **85** Health and social work; **92** Recreational, cultural and sporting activities	**50 to 51** Water transport, Air transport **58 to 63** Publishing activities, Motion picture, video and television programme production, sound recording and music publishing activities, Programming and broadcasting activities, Telecommunications, Computer programming, consultancy and related activities, Information service activities (section J) **64 to 66** Financial and insurance activities (section K) **69 to 75** Legal and accounting activities, Activities of head offices; management consultancy activities, Architectural and engineering activities; technical testing and analysis, Scientific research and development, Advertising and market research, Other professional, scientific and technical activities, Veterinary activities (section M) **78** Employment activities **80** Security and investigation activities **84 to 93** Public administration and defence, compulsory social security (section O), Education (section P), Human health and social work activities (section Q), Arts, entertainment and recreation (section R)
Less Knowledge-intensive Services (LKIS)	**50 to 52** Motor trade; **55** Hotels and restaurants; **60** Land transport; transport via pipelines; **63** Supporting and auxiliary transport activities; activities of travel agencies; **75** Public administration and defence; compulsory social security; **90** Sewage and refuse disposal, sanitation and similar activities; **91** Activities of membership organization n.e.c.; **93** Other service activities; **95 to 97** Activities of households; **99** Extra-territorial organizations and bodies	**45 to 47** Wholesale and retail trade; repair of motor vehicles and motorcycles (section G) **49** Land transport and transport via pipelines **52 to 53** Warehousing and support activities for transportation, Postal and courier activities **55 to 56** Accommodation and food service activities (section I) **68** Real estate activities (section L) **77** Rental and leasing activities **79** Travel agency, tour operator reservation service and related activities **81** Services to buildings and landscape activities **82** Office administrative, office

		support and other business support activities **94 to 96** Activities of membership organisations, Repair of computers and personal and household goods, Other personal service activities (section S) **97 to 99** Activities of households as employers of domestic personnel; Undifferentiated goods- and services-producing activities of private households for own use (section T), Activities of extraterritorial organisations and bodies (section U)

Yet, more complex classifications can be considered during the investigation phase to deepen our understanding of innovation process and knowledge diffusion in specific regions and industry sectors.

The product approach. To complement the sectoral approach, the OECD and Eurostat also use the product approach. The classification by product is based on the calculations of R&D intensity by groups of products (R & D expenditure/total sales). The groups classified as high-technology products are aggregated on the basis of the standard international trade classification (SITC). Two different definitions, one according SITC Rev. 3 and one according SITC Rev. 4, are available. However this approach provides a more appropriate instrument for analysing international trade and concerns the manufacturing industry only.

The Pavitt's taxonomy. Pavitt (1984) applied the idea of technological trajectories to the investigation of sectoral patterns of innovation. The Pavitt's taxonomy identifies four sectoral technological trajectories: supplier-dominated, scale-intensive, specialized suppliers, and science-based industries. This taxonomy can be useful for analysing the selected case studies as it gives a dynamic and systemic perspective by emphasising the interactions involving producers, suppliers and users of new technologies. The analysis of a regional sectoral specialisation according to the Pavitt's taxonomy can thus have implications for our understanding of the systemic innovation process and the formation of technological skills and advantages at the regional level. Moreover it is widely used in empirical woks based on Community Innovation Survey (CIS) data.

The Miozzo and Soete's taxonomy. The two authors have developed a taxonomy of services based on their technological linkages with manufacturing and other service sectors. This taxonomy is inspired by Pavitt's (1984) conceptualization. However, while Pavitt located all services in one of the four types of sectors that he identified, namely, supplier dominated firms, the taxonomy of services proposed by Miozzo and Soete emphasises the close interaction between manufacturing and service sectors both in terms of the origin and application of technological change. Three groups are identified by this taxonomy i) supplier-dominated sectors; ii) scale-intensive physical networks sectors and information networks sectors; iii) science-based and specialized suppliers sectors. This taxonomy presents the same advantages of the Pavitt's one.

The Castellacci's taxonomy. Castellacci (2008) defines a new sectoral taxonomy that combines manufacturing and service industries within the same overall framework. It is based on both a product-related type of classification and a sectoral classifications. The taxonomy is built up by focusing on two main characteristics of industrial sectors: the function they assume in the economic system as providers and/or recipients of advanced products, services and knowledge, i.e. their position in the vertical chain; and the dominant innovative mode that characterizes their technological activities and represents the technological content of an industry, i.e. the overall level of technological capabilities of innovative firms in the sectoral system. Using these two conceptual dimensions, this taxonomy identifies four major sectoral groups: advanced knowledge providers, mass production goods, supporting infrastructure services and personal goods and services. This classification can be used as a final synthesis of the previous ones.

Once the location of case studies is highlighted, best practice on knowledge creation and spillovers have to be identified.

Knowledge Creation Methodology

Knowledge Types & Patents Methodology

Hypothesis behind the methodology: The knowledge (all types) created in the region is not reflected in the number of patents/copyrights/IPR in the region.

The areas that produce knowledge creation are well known within the UK. For example, due to the number of innovative firms, spinoffs and prestigious Universities the Oxford area is world renowned for knowledge creation. The University presence is crucial in knowledge creation. However, there are different types of knowledge, and different ways of measuring their impact, that need to be explained, with their differences taken into account in these case studies.

Due to the high level of innovative output by biotechnology companies, who utilise analytical knowledge, they are leaders in patent numbers in the US and the UK. On the other hand, synthetic knowledge, which is often utilised by engineers in a 'problem-solving' capacity, which can be innovative, is not represented in the number of patents which could be due to the output format. Finally, for patent statistics, the creative industries, which would utilise symbolic knowledge, are not taken into account with patents although they may be counted in copyright and trademarks. Despite all of these discrepancies, the advantage of IPR data is that it can be used at a regional level. Due to the difference between innovation and invention, the patent data could not solely be used to supply information on the knowledge creation region; however, it could be used to validate the interview findings.

The advantage of this methodology is that it integrates the patent data as well as discussing the different types of knowledge that is being created in the case study location. The downside to this methodology is the difficulty in using it across sectors. Given the above analysis relating to the type of knowledge and the likelihood of IPR the results may greatly differ between biotechnology and creativity.

Knowledge Spillover Methodology

The proposed methodologies for the selection of knowledge spillovers are more than one, the methodologies that will be employed will vary between the type of case study and the data available in the region.

Cooke 'Industrial Office Rents' Methodology

Hypothesis 1: The primary reason firms situate themselves in clusters, instead of surrounding areas that have lower office rents, is due to the knowledge spillover in the location.
This methodology is adapted from a study completed by Cooke and De Laurentis in 2008 focusing on the Oxford ICT cluster. In this study, firms within the cluster were sent questionnaires relating to their reasons for locating their firm in the cluster. The results were surprising in that several firms realized they were a part of a cluster and knew the advantages of collaboration; however, they did not collaborate with other firms. They were more interested in the 'knowledge in the air'. Taking this a step forward, the industrial office rents within the cluster, where these firms resided, was compared to the office rents of a comparable location close to the cluster. It was found that the office rents within the cluster were three times those outside of the cluster, in a location nearby. This reinforced the questionnaire results that the firms found the cluster environment to be worth the expense of the office rent. Furthermore, the firms that did collaborate only performed marginally better than those that did not collaborate.

While the potential for knowledge spillover within the cluster was a significant pull factor for these firms, another pull factor would be the cluster's reputation. Further evidence of this can be seen in places like St. John's Innovation Centre in Cambridge where post office boxes are sold to firms wishing to have an address within the innovation centre. A less evolved exampled

would be Adastral Park in Ipswich which operates at close to maximum capacity; however, in lieu of a post box system, some firms actually rent the space but leave it empty. These examples demonstrate that the reputation of a location cannot be overlooked. Nonetheless, the Oxford example is based on the firm data placing the spillover effect as paramount.

For step two the 'innovative firms' should be further defined as each partner responsible for WP 2.4 may have a different definition. The initial inclination was to integrate the patent data into this WP at this point and use that as the determining factor for describing innovative firms; however, this presents two problems. First, the patent data is an indication of the number of inventions and not necessarily an indication of the number of innovations. A firm may have a high number of innovations, with no patents. Second, patents would not be available for the creative industries and copyright information would have to be reviewed which is not readily available. Attention was then turned to possibly reviewing the Community Innovation Survey; however, while this identifies regions it would not identify the firm- level results. This leaves the most logical solution for identifying innovative firms, that is interviews, either as primary or secondary sources. The definition of 'innovative' arises in step 2 of the other methodologies listed in this section as well and should be addressed in the same way as above.

The advantage of this methodology is the accessibility of the data which is widely available. In addition, the data produced could be used to construct a diagram to illustrate the knowledge spillover. The downside of using this methodology is the lack of insight into social networks which was a critique of the original proposal by the ESPON panel.

Boschma 'Social Networks' Methodology

Hypothesis 1: Clusters with a high number of spinoffs will have a highly mobile labour market (ie strong social networks and knowledge spillover).

This methodology is adapted from research completed by Boschma on social networks focusing on spinoff firms and the mobility of the labour market that they employ. This methodology has been applied to several sectors by Boschma such as: the fashion industry in Paris, the British automobile industry and Klepper with the American automotive industry in Detroit. While this approach is sector focused in nature, the region is of equal relevance given the absorptive capacity and the inability for knowledge spillover to travel distances. Due to the geographically bounded knowledge spillovers, the social networks in the location are dependent on the labour flows in the area. Therefore, the tie between the spinoffs and the labour market is the propensity of the social networks created by the labour market to produce knowledge spillovers in the region.

While this methodology overcomes the issues presented by the ESPON panel in that it focuses the case studies on social networks, the disadvantage is significant as the majority of nations in the EU do not have the labour mobility data.

The TPG will conduct 12 case studies, 6 on knowledge spillovers and 6 on knowledge creation.

Structured interviews on a questionnaire will be addressed to firms with the following main questions:

- in the development of the company, how was knowledge produced, obtained and used?
- what was the role of individuals and networks of experts in this process?
- what was the role of external and internal environment on the company?
- how the spillovers are influenced and differ in selected matrix circumstances? What is or could be the best practice to support such a spillovers?

Moreover, interviews will be run to several institutions (public and private) engaged in innovation support governance.

Annex 3.2.1. The Community Innovation Survey

The target population in CIS is the population of enterprises related to market activities, with 10 employees or more. As for the **time coverage**, the CIS3 database covers the three-year period from the beginning of 1998 to the end of 2000 whereas CIS4 covers 2002 to 2004 and CIS2006 from 2004 to 2006. However, not all NACE market activities are covered in these waves. A core target population is observed, with the following **7 sectors** being covered in the three waves:

mining and quarrying (NACE 10-14): Sector C
manufacturing (NACE 15-37): Sector D
electricity, gas and water supply (NACE 40-41): Sector E
wholesale trade (NACE 51): Sector G
transport, storage and communication (NACE 60-64): Sector I
financial intermediation (NACE 65-67): Sector J
computer and related activities (NACE 72): Sector K

Eurostat webpage for CIS provides information on the following indicators:

Product and process innovation

- Number of enterprises in current strata (realised sample)
- Product, developed by enterprise or group
- Product, developed in cooperation with other enterprises or institutions
- Product, developed mainly by other enterprises or institutions
- Process, developed by enterprise or group
- Process, developed in cooperation with other enterprises or institutions
- Process, developed mainly by other enterprises or institutions

Innovation activity and expenditure

- Total innovation expenditure
- Enterprises, engaged in intramural R&D
- Engaged in extramural R&D
- Engaged in acquisition of machinery
- Enterprises, engaged in other external knowledge
- Enterprises, engagement in training
- Enterprises, engaged in market introduction of innovation
- Enterprises, engaged in design, other preparation
- Total Expenditure in intramural R&D
- Total Expenditure in extramural R&D
- Total Expenditure in acquisition of machinery
- Total Expenditure in other external knowledge

Innovation co-operation in absolute value

- Cooperation arrangements on innovation activities

Public funding of innovation

- Enterprises received public funding

Other important strategic and organizational changes

- Undertake implementation of new corporate strategies
- Undertake implementation of advanced management techniques
- Undertake implementation of changed organisational structures
- Undertake changing enterprise's marketing concepts/strategies

The last group of indicators (i.e. related to "organizational and marketing innovations") differ according to the different CIS waves and to the availability provided. In particular, as to CIS3 we will provide the ones presented above, whereas as to CIS4 we will provide with the information of these 3 variables:

- Enterprise introduced organisational and/or marketing innovations
- Enterprise introduced organisational innovation
- Enterprise introduced marketing innovation

and finally, as to CIS2006, the indicator will be only that of the number of enterprises that introduced organisational and/or marketing innovations.

Annex 3.2.2. Methodology for the estimate of regional data from CIS national data

For what concerns product, process and managerial innovation (source: CIS), some national and regional data are missing. The TPG will estimate the data starting from the national or NUTS1 data, by dividing the national data on the basis of the regional sectoral specialization and on the share of professions. For product innovation, the share of scientists will be used; for managerial innovation, the share of managers (as a proxy for managerial functions) will be used; for process innovation, both the percentage of managers and blue collar workers will be used.

Annex 3.2.3. Capacity to adopt the innovation made by others (innovation adoption)

An important issue relatively unexplored in the economic literature is innovation diffusion/adoption. After a set of pros and cons of different alternative measures of innovation adoption (that will be analysed in more detail in the next report), we chose the following indicator: **Number of adopting enterprises / Number of enterprises with process and/or product innovation or with ongoing or abandoned innovation activities**
To construct such an indicator, firms are considered to be adoptive if they declare that their process or product innovations have been developed "Mainly together with other enterprises or institutions" or "Mainly by other enterprises or institutions".
In order to obtain the best country coverage (one of the priorities of this project is having the widest database possible to be able to make comparisons with the major number of countries/regions possible when analyzing the innovation adoption phenomena and their determinants), a database was built from micro and macro data following the availability of information according to countries. We aggregated the firm-level information at a country level and then, merged this information with the web-site data whenever needed (that is, when information for a country was not directly available in the micro-data).
This procedure has the advantage of providing us with a larger number of countries than in the case of working only with the firm micro dataset. However, due to the way the Eurostat web-site provides the data at a macro level, it is possible that a double counting problem arises. This is the case here. Using the macro dataset, we face a double counting problem in our definition of innovation diffusion. We can obtain the number of firms for which innovation has been developed "Mainly together with other enterprises or institutions" and "Mainly by other enterprises or institutions" in terms of product, on the one hand, and in terms of process, on the other hand. But, this information about product and process innovations cannot be crossed. So, firms for which both product AND process innovations have been developed in cooperation with others or mainly by others, are double counted. The problem here is, therefore, that for those countries for which we have data coming only from the web-site, the rates of innovation adoption rates may be systematically higher than for the countries for which we have data at the firm level (micro dataset). Nonetheless, in order to have the widest coverage as possible, we suggest using, for our adoption indicator, a procedure likely to correct the bias due to double counting: we followed a rescaling procedure to compute a global rate of adoption.[19]
To correct for these differences, macro data have been rescaled by using a common factor. This factor is the average of the ratios between the available observations common in macro and micro data. A "caveat" when using this re-scaling procedure is that we will have to assume that the "re-scaling common factor" which we are able to compute for the countries for which we have data for both the micro and macro datasets will hold also for all the other countries. However, there is no obvious reason to believe that the "double counting problem" should affect the rest of the countries more than what it does for the countries for which we have data from micro and macro sources. In fact, the double counting problem should apply the same way to all the other countries such that the use of the common factor is not a very restrictive

[19] The adoption rates for process and product innovations separately do not suffer from this problem.

assumption.
Micro data have been favoured for the countries for which we have the two datasets. In other words, for those countries with data at the firm level, we use the adoption rates coming from the aggregation of such micro data. This choice is due to the fact that, using the macro dataset, we face this double counting problem in the construction of the general indicator of innovation diffusion/adoption. However, since for some countries we only have the national data from the webpage, we use it and make a rescaling procedure to try to reduce the double counting problem.

Annex 3.2.4. Regional innovation scoreboard indicators

RIS provides the following indicators for 2004 and 2006:

- Tertiary education
- Life-long learning
- Broadband access
- Public R&D expenditures
- Business R&D expenditures
- Non-R&D innovation expenditures
- SMEs innovating in-house
- Innovative SMEs collaborating with others
- EPO patents
- Product and/or process innovators
- Marketing and/or organisational innovators
- Resource efficiency innovators - Labour
- Resource efficiency innovators - Energy
- Employment medium-high & high-tech manufacturing
- Employment knowledge-intensive services
- New-to-market sales
- New-to-firm sales

Annex 3.2.5. Inventors mobility indicator

Data on geographical mobility patterns of skilled labour and talented individuals across regions are scarce. In this project we study the mobility patterns of inventors defined as those individuals who have applied for patents to the European Patent Office in a given period. Of course, they are only a subsample of skilled labour. However, they are those individuals most involved with innovation and knowledge creation issues.
Our methodology to obtain these data is divided in two basic steps. First of all, we will identify unique inventors using patent documents extracted from the REGPAT database (OECD REGPAT database, January 2010 edition). The OECD has undertaken a valuable job aimed to regionalise patent data and match inventors' addresses reported in patent documents with the different levels of regions within the OECD countries (NUTS for the case of Europe). This regionalisation procedure provides researchers with a complete dataset of patents applied for under the European Patent Office (EPO hereafter), containing a rich amount of information, i.e., the publication number, the priority year (that is to say, the year when a patent was filed for the first time), information about the name, address, region code and country code of the inventor(s) and applicant(s) of each patent, the share of the patent that corresponds to each inventor or applicant -in order to take account of co-authorships and multi-applicants, and finally the technological class(es) to which each patent corresponds. The first stage, that of identifying inventors, will be explained in detail in the next report.
Second, once the unique inventors and their careers are identified, we will be able to report the mobility patterns of these inventors across European regions and build measures of flows of inventors in and outside the regions for a given period. Two variables are built –both from a regional perspective:
- Inflows of inventors: total number of inventors who have come into a given region within a given time period;
- Outflows of inventors: total number of inventors who have gone outside a given region

within a given time period.
To construct these two variables, we first sort all the patents by year of application for each of the inventors. If an inventor has applied for patents within the same year, we sort these patents using the exact date of application. We define that an inventor has moved to another region when after having patenting in one region, she has another patent in a different region. Obviously, inventors with only one patent are discarded because mobility cannot be observed by definition. With this information, we build an NxN matrix, being N the total number of regions, whose elements are the total amount of inventors coming from region i (in the vertical axis) to region j (in the horizontal axis). Movements from region i to region i do not exist by definition. To allocate the movement in a moment in time, we chose the midpoint between the application dates of the origin region patent and the destination region patent (as in Singh and Agrawal, 2009)[20].
If we sum all the rows of the matrix, we end up with a 1xN vector containing the number of inflows for each of the N regions. If we sum all the columns, we end up with an Nx1 vector containing the number of outflows for each of the N regions. We calculate these vectors year by year. If an inventor moves more than once or she returns to her former region, we count them as separate and independent movements. We will present these two variables for the **NUTS2 regions in the 31 ESPON countries**, as the total number of inflows and outflows in the next periods: **1991-1995, 1996-2000 and 2001-2005**.

Annex 3.2.6. Social innovation indicators

- Broadband penetration,
    - 2006: BE missing; NUTS0 data for CZ, DK, FR, GR, HU, IE, PT, RO, SE; NUTS1 data for DE, PL
    - 2007: BE and SK missing; NUTS0 data for CZ, DK, FR, GR, HU, IE, PT, RO, SE; NUTS1 data for DE, PL
    - 2008: NUTS0 data for DK and IE; NUTS1 data for DE, SE
    - 2009: NUTS0 data for CZ; NUTS1 data for DE

CH and LI missing for all years.

- Workforce in high-tech industries
    - 2008: BG missing.

CH and LI missing for all years.

- Individuals who ordered goods or services, over the Internet, for private use, in the last year (e-comm),
    - 2006: NUTS0 data for BE, CZ, DK, GR, HU, IE, PT, RO, SE; NUTS1 data for DE, FR, PL.
    - 2007: NUTS0 data for BE, CZ, DK, GR, HU, IE, PT, RO, SE; NUTS1 data for DE, FR, PL.
    - 2008: NUTS0 data for IE; NUTS1 data for DE, FR, SE.
    - 2009: NUTS0 data for CZ; NUTS1 data for DE.

CH and LI missing for all years.

- Individuals regularly using the internet
    - 2006: NUTS0 data for BE, CZ, DK, GR, HU, IE, PT, RO, SE; NUTS1 data for DE, FR, PL.
    - 2007: NUTS0 data for BE, DK, GR, HU, IE, PT, RO, SE; NUTS1 data for DE, FR, PL.
    - 2008: NUTS0 data for IE; NUTS1 data for DE, FR, SE.
    - 2009: NUTS0 data for CZ; NUTS1 data for DE and FR.

CH and LI data are missing.

- Human resources in Science and Technology
    - 2006: DK, LI data are missing
    - 2007: no missing among the 31 ESPON countries.
    - 2008: no missing among the 31 ESPON countries.

[20] Singh J. and Agrawal A. K. (2009) Recruiting for Ideas: A Difference-in-Differences Approach for Estimating the Effect of Mobility on Access to an Inventor's Prior Knowledge, INSEAD Working Paper No. 2009/46/ST.

Annex 3.2.7. Specific territorial, social and economic indicators currently available at NUTS 2 level for 27 EU countries

Data	Definition	Source of raw data
Agglomerated regions	With a city of > 300,000 inhabitants and a population density > 300 inhabitants / km sq. or a population density 150 – 300 inhabitants / km sq.	Espon database
Urban regions	With a city of between 150,000 and 300,000 inhabitants and a population density 150 – 300 inhabitants / km sq. (or a smaller population density – 100-150 inh. /km with a bigger centre (>300,000) or a population density between 100 – 150 inh./km sq.	Espon database
Rural regions	With a population density < 100 / km sq. and a centre > 125,000 inh. or a population density < 100 / km sq. with a centre < 125,000.	Espon database
Mega regions	Regions with the location of at least one of the 76 'Megas' - FUAs with the highest scores on a combined indicator of transport, population, manufacturing, knowledge, decision-making in the private sectors.	Espon database
Regional population	Regional average population in each year at NUTS 2 level in the years 1995 – 2005.	Eurostat
Net immigration flows (people aged between 17-27 years)	Average net immigration flows of people aged between 17-27 years in the period 1/1/95 – 1/1/00 at NUTS 2 level.	Espon database
Net immigration flows (people aged between 32-42 years)	Average net immigration flows of people aged between 32-42 years in the period 1/1/95 – 1/1/00 at NUTS 2 level.	Espon database
Net immigration flows (people aged between 52-67 years)	Average net immigration flows of people aged between 52-67 years in the period 1/1/95 – 1/1/00 at NUTS 2 level.	Espon database
Data	Definition	Source of raw data
Regional birth rate	Share of births on population at NUTS 2 level in the years 1995 – 2005.	Eurostat
Regional mortality rate	Share of deaths on population at NUTS 2 level in the years 1995 – 2005.	Eurostat
Regional trust	share of respondents in the EU Value Survey which have high or very high trust in other persons.	EU Value Survey
Energy consumption	Share of energy toe (tons oil equivalent) on 100 inhabitants at NUTS0 1990-2002, source ESPON project 2.1.4. Estimations at NUTS2 level as reported in Capello et al., 2008..	Our estimation from national data of ESPON 2.1.4
Energy price elasticity[2]	% change in GDP due to 10% change in energy price.	Espon 2.1.4 project
Indicators	Definition	Source of raw data
Regional GDP	Regional GDP in real terms at NUTS2 level in the period 1995-2005, computed from the nominal one, using national GDP deflators.	Eurostat
Regional employment growth of the tertiary and manufacturing sectors.	Regional employment growth of the tertiary and manufacturing sectors, computed from absolute employment in the years of period 1995-2005.	Eurostat
Regional employment by NACE 2 sector	Regional NUTS2 employment for each NACE 2 sector for the year 2002	IGEAT matrix[1]
Regional value added by NACE sector	Regional value added for each NACE 2 sector for the years 1995, 2002 and 2004	IGEAT matrix
Regional employment by function (ISCO)	Regional employment by function at ISCO 2 digit classification at Nuts 2 level.	European Labour Force Survey
Regional population growth rate	Population growth rate at NUTS 2 in the period 1995-2005	Eurostat
Regional unemployment	Share of unemployed people, available for the period 1995-2005.	Eurostat
Regional infrastructure endowment	Km of high speed railways, main rails, express roads, motorways and inland waterways in year 2000.	KTEN data within the Espon database

Structural funds	Total structural funds expenditure in the period 1994-1999. Also divided into 5 types of expenditure.	Espon database
Levels of education	Number of students by ISCED level of education	EUROSTAT
Cultural values	Percentage of people trusting others, stating interest in political, religious and social volunteering.	European Values Study

Annex 3.2.8. Available variables for China

Variables	Definition	Average over the period	Sources	Note
Patent				
PCT application per capita (per 1000 persons) (PCT_app_pc)	Number of PCT application / total regional population	1994-2007	OECD.Stat	
Share of PCT application (per 100 million yuan) (PCT_app_per)	Number of PCT applications per 100 millions regional GDP	1994-2007	OECD.Stat	
Innovation				
Share of expenditures on Science and Technology (S&T) (Exp_st_per)	Intramural expenditure on S&T as share of regional GDP	1994-2007	China Statistical Yearbook on Science and Technology, 1991-2008	The intramural expenditures on S&T activities are collected from three sectors: (1) independent research and science institutions under government, (2) higher learning education and (3) large and medium enterprises: generally based on UNSECO rules, (1) research and experimental development (R&D), (2) R&D applied services (3) scientific and technological services (STS) and (4) S&T popularization activities
Share of expenditure on Research and development (R&D) (Exp_rd_per)	Intramural expenditure on R&D as share of regional GDP	1998-2007	China Statistical Yearbook on Science and Technology, 1991-2008 (the first year of state-level R&D data is from 1998)	The intramural expenditures on R&D activities are collected from three sectors: (1) independent research and science institutions under government, (2) higher learning education and (3) large and medium enterprises
Social Filter				
Agricultural labour force (Em_rural)	Agricultural employment as share of total employment	1994-2007	China Statistical Yearbook, 1991-2008	
Unemployment rate (Um-urban)	Rate of unemployment in urban area	1994-1995, 2001-2007	China Statistical Yearbook, 1991-2008	
Young people (pop_1524)	People aged 15-24 as share of total population	1995, 2000 and 2005	China Population Census Data	
Educational attainment (edu_xxx)	Persons above 6 years and over— college and higher degree and as share of total population	1995-2007	China Statistical Yearbook, 1991-2008	
Structure of local economy				

GDP per capita (gsdp_pc)	Calculated as regional gross domestic product /regional population (units)	1994-2007	China Statistical Yearbook, 1991-2008
Population density (popden)	Calculated as average population (units) year/surface of the region (Sq km)	1994-2007	China Statistical Yearbook, 1991-2008
Krugman index (k_index)	The index is calculated on the basis of the employment in 16 major industry groups reported by 1990 year statistic classification. $K_z(t) = \sum_j abs\left(S_{zjt} - \overline{S}_{zjt}\right)$ $S_{zjt} = \frac{y_{zjt}}{\sum_z y_{zjt}}$ the share of industry j in state z at time t, $\overline{S}_{zjt} = \frac{\sum_{s \neq z} y_{zjt}}{\sum_j \sum_{s \neq z} y_{zjt}}$ the share of industry j in all other states at time t:	1994-2002(total employment) 2003-2006 (urban employment)	China Statistical Yearbook, 1991-2008

Annex 3.2.9. Available variables for India

Variables	Definition	Available year	Sources**	Note
Patent				
PCT application per capita (per 1000 persons) (PCT_app_pc)	Number of PCT application / total regional population	1994-2007	OECD.Stat	
Share of PCT application (per 100 million rupee) (PCT_app_per)	Number of PCT applications per 100 millions regional GDP	1994-2007	OECD.Stat	
Innovation				
Central extramural and state government expenditure for R&D (Exp_rdall_per)	Combine central extramural and state govt. expenditure for R&D as a share of regional GDP	1994-1995 to 2002-2003	Research and development statistics 2004-05 & 2007-08 Research and Development in Industry 2000-01, Ministry of Science and Technology, Govt. of India	Extramural R&D: 12 major scientific agencies/ department. Institutions receiving support from funding agencies classified into five categories: Universities/Colleges and Universities, Institutes of National Importance, National Laboratories and other Institutions under State Governments, Voluntary Agencies, Registered Societies.
State government expenditure on S&T (Exp_ststate_per)	State government expenditure on S&T under 5 year plan as share of regional GDP	1994 to 2006-2007	Planning Commission, India	
Social Filter				
Unemployment rate (Unem_rural, Unem_urban)	Rate of unemployment in urban and rural area respectively	1993-1994, 1999-2000 and 2004-2005	Planning Commission, Govt. of India.	

Agricultural labour force (Worker_agri_ratio)	Agricultural employment as share of total employment	1991-1992, 2001-2002	Census of India 1991, 2001
Higher Education (Edu_ur_coll, Edu_ru_coll)	Number of persons above 7 years and over with college, diploma and higher degree as per 1000 persons in urban and rural area respectively	1995-1996, 1999-2000 to 2001-2002, 2003-2004 to 2006-2007	National Sample Survey
Young people (pop_1524)	People aged 15-24 as share of total population	1991-1992, 2001-2002	Census of India 1991, 2001
Structure of local economy			
Population density (popden)	Calculated as average population (units) year/surface of the region (Sq km)	1990-1991 to 2006-2007	Central statistic office
GDP per capita (gsdp_pc)	Calculated as regional gross domestic product/regional population (units)	1990-1991 to 2006-2007	Central statistic office
Krugman Index (k_index)	The index is calculated from regional GDP by 13 industrial sector $K_z(t) = \sum_j abs\left(S_{zjt} - \overline{S}_{zjt}\right)$ $S_{zjt} = \frac{y_{zjt}}{\sum_z y_{zjt}}$ the share of industry j in state z at time t, $\overline{S}_{zjt} = \frac{\sum_{s \neq z} y_{zjt}}{\sum_j \sum_{s \neq z} y_{zjt}}$ the share of industry j in all other states at time t:	1990-1991 to 2006-2007	Central statistic office

Annex 3.2.10. Available variables for USA

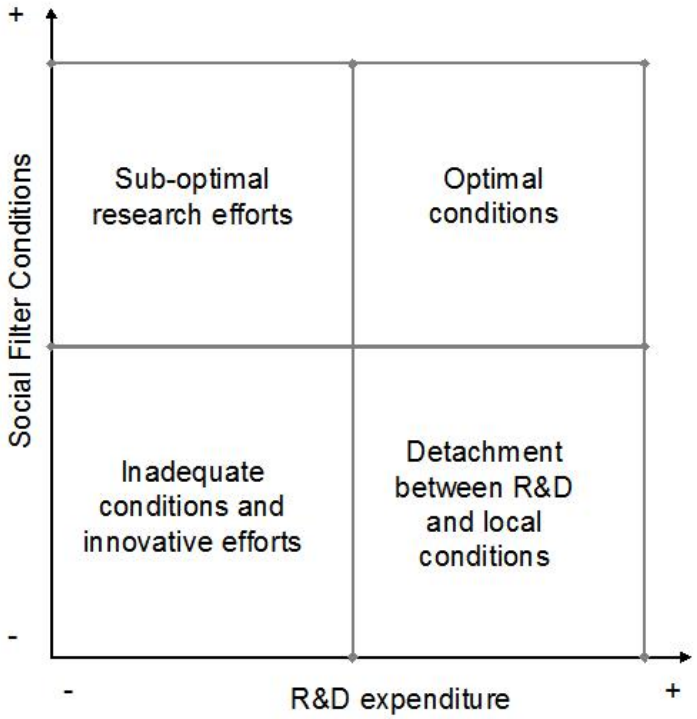
Variables	Definition	Available year	Sources**
PCT application per capita (per 1000 persons) (PCT_app_pc)	Number of PCT application / total regional population	1994-2007	OECD.Stat
Share of PCT application (per 100 million USD) (PCT_app_per)	Number of PCT applications per 100 millions regional GDP	1994-2007	OECD.Stat
Innovation			
		1990-(2000)	Compustat.
R&D	Private expenditure on R&D as a % of GDP was calculated from Standard & Poor's Compustat North America firm-level data		Standard & Poor's Compustat North American firm-level data which provide a proxy for private R&D expenditure in 145 MSAs out of the total of 266. The proxy was calculated by summing up firms' R&D expenditure in each MSA. Though rough, this is the only measure available and similar proxies have been commonly used in the literature on the MSA innovative activities (e.g. Feldman 1994).
Social Filter			
Education: bachelor's, graduate or professional degrees	Persons 25 years and over - some college or associate degree as a percentage of total population	1990-(2000)	US-Census data included in the USA Counties 1998 CD-Rom.
Education: some college level education	Persons 25 years and over - bachelor's, graduate, or professional degree as a percentage of total population	1990-(2000)	US-Census data included in the USA Counties 1998 CD-Rom.
Agricultural Labour Force	Agricultural employment as % of total employment	1990-(2000)	US-Census data included in the USA Counties 1998 CD-Rom.
Unemployment Rate	Rate of unemployment	1990-(2000)	US-Census data included in the USA Counties 1998 CD-Rom.
Young People	People aged 15-24 as % of total population	1990-(2000)	US-Census data included in the USA Counties 1998 CD-Rom.
Structure of the local economy			
Population density	Calculated as Average Population (units) in the base year/ Surface of the region (Sq Km)	1990-(2000)	US-Census data included in the USA Counties 1998 CD-Rom.
% regional of national GDP	Total regional GDP as a percentage of national GDP	1990-(2000)	US-Census data included in the USA Counties 1998 CD-Rom.
Krugman index of specialisation	The index is calculated on the basis of the 13 major industry groups reported by 1990 census classification and developed from the 1987 Standard Industrial Classification (SIC) Manual.	1990-(2000)	US-Census data included in the USA Counties 1998 CD-Rom.

Annex 3.2.11. Conceptual categories for the comparison of EU vs USA, China, India

The comparative analysis of the **EU vs. US, China and India** at the territorial level can be based on the identification of 'regions' showing similar characteristics in terms of the relationship between indigenous innovative efforts and 'social filter' conditions,

Fig. A.2 presents a visual representation of this relationship by analysing all the possible combinations between local innovative efforts (as proxied by R&D expenditure) and social filter conditions (proxied by the Social Filter index).

Figure A.2 - Local innovative efforts and social filter conditions



Source : Crescenzi and Rodriguez-Pose (2010)

The theoretical analysis suggests that the "optimal conditions" for economic success are met where a considerable amount of innovative effort is pursued in an innovation prone socio-economic environment (top right quadrant of the graph). Conversely, economic performance seems to be significantly hampered by the co-existence of "inadequate social filter conditions and innovative efforts". In this latter case endogenous efforts are reduced and their effects on the local economy are negatively affected by the inadequate environment. In addition to these two opposite cases a variety of intermediate situations are possible. In particular, a region with a favourable "social filter" may pursue "sub-optimal research efforts" or relevant investment in R&D may be undertaken in an unfavourable socio-economic environment i.e. where an "inconsistency between R&D and local conditions" is recorded. In the former case the theory suggests the possibility of benefiting from externally produced innovation which may partially compensate for the inadequacy of local efforts. In the latter case, instead, R&D investments run the risk to produce the "cathedrals in the desert" effect.

EU regions in a specific 'quadrant' of this conceptualisation are more likely to develop functional links with US, Indian or Chinese 'regions' with similar characteristics in terms of innovation determinants. For example EU regions where Systems of Innovation conditions are stronger are more likely to develop functional links with the US, China and India based on International Systems of Innovation. Conversely, where codified R&D activities are the key drivers of regional innovation, formal R&D collaborative projects are more likely to support the exposure of the local economy to external knowledge.

Table A.3.2.1 – Data availability for CIS3 indicators (macro dataset)

	Product and process innovation							Innovation activity and expenditure in 2000												Innovation co-operation during 1998-2000 in absolute value	Public funding of innovation	Other important strategic and organizational changes			
Country	Number of enterprises in current strata (realised sample)	Product, developed by enterprise or group	Product, developed in cooperation with other enterprises or institutions	Product, developed mainly by other enterprises or institutions	Process, developed by enterprise or group	Process, developed in cooperation with other enterprises or institutions	Process, developed mainly by other enterprises or institutions	Total innovation expenditure for 2000	Enterprises, engaged in intramural R&D	Engaged in extramural R&D	Engaged in acquisition of machinery	Enterprises, engaged in other external knowledge	Enterprises, engagement in training	Enterprises, engaged in market introduction of innovation	Enterprises, engaged in design, other preparation	Total Expenditure in intramural R&D for 2000	Total Expenditure in extramural R&D for 2000	Total Expenditure in acquisition of machinery for 2000	Total Expenditure in other external knowledge for 2000	Cooperation arrangements on innovation activities	Yes, enterprise received public funding	Undertake implementation of new corporate strategies	Undertake implementation of advanced management techniques	Undertake implementation of changed organisational structures	Undertake changing enterprise's marketing concepts/strategies
AT	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X
BE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BG	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X
CY	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X
CZ	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X
DE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DK	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
EE	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X
ES	X							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FI	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
HU	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X
IE	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	X	X	X	X	-	-	-	-	-
IS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
IT	X	X	X	X	X	X	X	X	X								X	X	X	X	X	X	X	X	X	X
LT	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	X	X	X	X	-	X	X	X	X
LU	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X
LV	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X
MT	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X
NL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PL	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	X	X	X	X	X	-	-	-	-
PT	X	X	X	X	X	X	X	X	X								X	X	X	X	X	X	X	X	X	X
RO	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X
SE	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X
SI	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X
SK	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X
TR	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	X	X	X	X	-	X	X	X	X
UK	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X

Table A.3.2.2.4.a – Data availability for CIS4 indicators (macro dataset)[21]

	Product and process innovation							Innovation activity and expenditure in 2004												Innovation co-operation during 2002-2004 in absolute value	Public funding of innovation	Organisational and marketing innovations		
Country	Total number of enterprises in the population in 2004	Product, developed by enterprise or group	Product, developed in cooperation with other enterprises or institutions	Product, developed mainly by other enterprises or institutions	Process, developed by enterprise or group	Process, developed in cooperation with other enterprises or institutions	Process, developed mainly by other enterprises or institutions	Total innovation expenditure	Enterprises, engaged in intramural R&D	Engaged in extramural R&D	Enterprises, engaged in acquisition of machinery, equipment and software	Enterprises, engaged in other external knowledge	Enterprises, engagement in training	Enterprises, engaged in market introduction of innovation	Enterprises, engaged in other preparations	Expenditure in intramural R&D in 2004	Expenditure in extramural R&D in 2004	Expenditure for acquisition of machinery, equipment and software in 2004	Expenditure for acquisition of other external knowledge in 2004	All types of co-operation	Enterprise that received any public funding	Enterprise introduced organisational and/or marketing innovations	Enterprise introduced organisational innovation	Enterprise introduced marketing innovation
AT	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X
BE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BG	X	X	X	X	K	X	X	X	X	X	X	X	X	X	K	X	X	X	X	X	X	X	X	X
CY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CZ	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DK	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X
EE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ES	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FI	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-
FR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
HU	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
IE	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	X	X	X	X	X	-	X	X	X
IS	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-
IT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LU	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LV	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-
MT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X
NL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
RO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	J	X	X	X
SE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
SI	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-
SK	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-
UK	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-

[21] We present data availability of CIS macro-dataset with sectoral breakdown only for CIS4 because it is less affected by missing data as compared to CIS3 and CIS2006.

Table A.3.2.2.4.b – Data availability for CIS4 indicators – Sector C (macro dataset)

		Product and process innovation							Innovation activity and expenditure in 2004												co-operation during 2002-2004 in absolute value	Public funding of innovation	Organisational and marketing innovations		
Country	Country	Total number of enterprises in the population in 2004	Product, developed by enterprise or group	developed in cooperation with other enterprises or institution	Product, developed mainly by other enterprises or institutions	Process, developed by enterprise or group	developed in cooperation with other enterprises or institutions	Process, developed mainly by other enterprises or institutions	Total innovation expenditure	Enterprises, engaged in intramural R&D	Engaged in extramural R&D	s engaged in acquisition of machinery, equipment and software	Enterprises engaged in other external knowledge	Enterprises engagement in training	Enterprises engaged in market introduction of innovation	Enterprises engaged in other preparations	Expenditure in intramural R&D in 2004	Expenditure in extramural R&D in 2004	for acquisition of machinery, equipment and software in 2004	Expenditure for acquisition of other external knowledge in 2004	All types of co-operation	Enterprise that received any public funding	Enterprise introduced organisational and/or marketing innovations	Enterprise introduced organisational innovation	Enterprise introduced marketing innovation
Austria	AT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Belgium	BE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bulgaria	BG	X	-	X	X	X	-	-	X	-	-	X	-	-	-	X	-	-	-	-	X	-	X	X	-
Cyprus	CY	X	X	X	X	X	X	X	X	-	-	X	-	X	X	X	-	-	X	-	-	X	X	X	X
Czech Republ	CZ	X	X	-	-	X	X	-	X	X	X	X	-	X	X	X	X	X	X	-	X	-	X	X	X
Germany (ind	DE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Denmark	DK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estonia	EE	X	X	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X
Spain	ES	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Finland	FI	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
France	FR	X	X	X	-	X	X	-	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X
Greece	GR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hungary	HU	X	-	-	-	-	-	-	X	-	-	X	-	X	-	-	-	-	X	-	-	-	-	-	-
Ireland	IE	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-	X	X	X	X	-	X	X	X
Iceland	IS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Italy	IT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lithuania	LT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Luxembourg	LU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Latvia	LV	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Malta	MT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	NL	X	X	X	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	-
Norway	NO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Poland	PL	X	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Portugal	PT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Romania	RO	X	X	-	-	X	X	-	X	X	X	X	-	X	X	-	X	X	X	X	X	X	X	X	-
Sweden	SE	X	X	-	-	X	X	-	X	X	X	X	X	X	-	-	X	-	X	-	-	-	-	-	-
Slovenia	SI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Slovakia	SK	X	-	-	-	X	-	X	X	-	X	X	-	X	X	-	X	X	X	-	X	-	X	X	-
Turkey	TR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-
United Kingd	UK	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-

Table A.3.2.2.4.c – Data availability for CIS4 indicators – Sector D (macro dataset)

		Product and process innovation							Innovation activity and expenditure in 2004												Innovation co-operation during 2002-2004 in absolute value	Public funding of innovation	Organisational and marketing innovations		
Country	Country	Total number of enterprises in the population in 2004	Product, developed by enterprise or group	Product, developed in cooperation with other enterprises or institutions	Product, developed mainly by other enterprises or institutions	Process, developed by enterprise or group	Process, developed in cooperation with other enterprises or institutions	Process, developed mainly by other enterprises or institutions	Total innovation expenditure	Enterprises, engaged in intramural R&D	Engaged in extramural R&D	Enterprises, engaged in acquisition of machinery, equipment and software	Enterprises, engaged in other external knowledge	Enterprises, engagement in training	Enterprises, engaged in market introduction of innovation	Enterprises, engaged in other preparations	Expenditure in intramural R&D in 2004	Expenditure in extramural R&D in 2004	Expenditure for acquisition of machinery, equipment and software in 2004	Expenditure for acquisition of other external knowledge in 2004	All types of co-operation	Enterprise that received any public funding	Enterprise introduced organisational and/or marketing innovations	Enterprise introduced organisational innovation	Enterprise introduced marketing innovation
Austria	AT	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X
Belgium	BE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Bulgaria	BG	X	-	-	X	X	X	X	X	-	-	X	X	X	X	X	-	-	X	X	X	X	X	X	X
Cyprus	CY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Czech Republ	CZ	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Germany (in	DE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Denmark	DK	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X
Estonia	EE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Spain	ES	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Finland	FI	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-
France	FR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Greece	GR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hungary	HU	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ireland	IE	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	X	X	X	X	X	-	X	X	X
Iceland	IS	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-
Italy	IT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lithuania	LT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Luxembourg	LU	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Latvia	LV	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-
Malta	MT	X	X	X	X	-	X	X	X	X	X	-	X	-	-	-	X	X	-	X	-	-	-	X	X
Netherlands	NL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Norway	NO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Poland	PL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Portugal	PT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Romania	RO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sweden	SE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	-	-	-	-
Slovenia	SI	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-
Slovakia	SK	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Turkey	TR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-
United Kingd	UK	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-

Table A.3.2.2.4.d – Data availability for CIS4 indicators – Sector E (macro dataset)

		Product and process innovation							Innovation activity and expenditure in 2004												Innovation co-operation during 2002-2004 in absolute value	Public funding of innovation	Organisational and marketing innovations		
Country	Country	Total number of enterprises in the population in 2004	Product, developed by enterprise or group	Product, developed in cooperation with other enterprises or institutions	Product, developed mainly by other enterprises or institutions	Process, developed by enterprise or group	Process, developed in cooperation with other enterprises or institutions	Process, developed mainly by other enterprises or institutions	Total innovation expenditure	Enterprises, engaged in intramural R&D	Engaged in extramural R&D	Enterprises, engaged in acquisition of machinery, equipment and software	Enterprises, engaged in other external knowledge	Enterprises, engagement in training	Enterprises, engaged in market introduction of innovation	Enterprises, engaged in other preparations	Expenditure in intramural R&D in 2004	Expenditure in extramural R&D in 2004	Expenditure for acquisition of machinery, equipment and software in 2004	Expenditure for acquisition of other external knowledge in 2004	All types of co-operation	Enterprise that received any public funding	Enterprise introduced organisational and/or marketing innovations	Enterprise introduced organisational innovation	Enterprise introduced marketing innovation
Austria	AT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-
Belgium	BE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-
Bulgaria	BG	X	X	-	X	X	-	-	X	X	X	X	-	-	-	X	X	X	-	-	X	-	X	X	-
Cyprus	CY	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	X
Czech Republ	CZ	X	X	-	-	X	X	-	X	X	X	X	-	X	X	X	X	X	X	X	X	-	X	X	X
Germany (in	DE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Denmark	DK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estonia	EE	X	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Spain	ES	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Finland	FI	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
France	FR	X	X	X	-	X	X	-	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X
Greece	GR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hungary	HU	X	-	-	X	X	-	X	X	-	-	X	X	X	-	X	-	-	X	X	-	-	-	-	-
Ireland	IE	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	X	X	X	X	X	-	X	X	X
Iceland	IS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Italy	IT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lithuania	LT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Luxembourg	LU	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-
Latvia	LV	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Malta	MT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	NL	X	X	X	-	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X
Norway	NO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Poland	PL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Portugal	PT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Romania	RO	X	X	-	-	X	X	-	X	X	X	X	-	X	X	-	X	X	X	X	X	X	X	X	-
Sweden	SE	X	X	-	-	X	X	-	X	X	X	X	X	X	-	-	X	X	X	-	-	-	-	-	-
Slovenia	SI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Slovakia	SK	X	-	-	-	X	X	X	X	-	X	X	-	X	X	-	X	X	X	-	X	X	X	X	-
Turkey	TR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-
United King	UK	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A.3.2.2.4.e – Data availability for CIS4 indicators – Sector G (macro dataset)

		Product and process innovation							Innovation activity and expenditure in 2004												Innovation co-operation during 2002-2004 in absolute value	Public funding of innovation	Organisational and marketing innovations		
Country	Country	Total number of enterprises in the population in 2004	Product, developed by enterprise or group	Product, developed in cooperation with other enterprises or institutions	Product, developed mainly by other enterprises or institutions	Process, developed by enterprise or group	Process, developed in cooperation with other enterprises or institutions	Process, developed mainly by other enterprises or institutions	Total innovation expenditure	Enterprises, engaged in intramural R&D	Engaged in extramural R&D	Enterprises, engaged in acquisition of machinery, equipment and software	Enterprises, engaged in other external knowledge	Enterprises, engagement in training	Enterprises, engaged in market introduction of innovation	Enterprises, engaged in other preparations	Expenditure in intramural R&D in 2004	Expenditure in extramural R&D in 2004	Expenditure for acquisition of machinery, equipment and software in 2004	Expenditure for acquisition of other external knowledge in 2004	All types of co-operation	Enterprise that received any public funding	Enterprise introduced organisational and/or marketing innovations	Enterprise introduced organisational innovation	Enterprise introduced marketing innovation
Austria	AT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Belgium	BE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Bulgaria	BG	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cyprus	CY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Czech Republ	CZ	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Germany (inc	DE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Denmark	DK	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	-	X	-	-	X	X	X	X	X
Estonia	EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spain	ES	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Finland	FI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
France	FR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Greece	GR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	HU	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ireland	IE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iceland	IS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Italy	IT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lithuania	LT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Luxembourg	LU	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
Latvia	LV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Malta	MT	X	X	X	X	X	-	X	X	X	-	X	X	X	X	X	X	-	X	X	X	-	X	X	X
Netherlands	NL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Norway	NO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Poland	PL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X
Portugal	PT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Romania	RO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sweden	SE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
Slovenia	SI	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-
Slovakia	SK	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Turkey	TR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-
United Kingd	UK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A.3.2.2.4.f – Data availability for CIS4 indicators – Sector I (macro dataset)

		Product and process innovation							Innovation activity and expenditure in 2004												Innovation co-operation during 2002-2004 in absolute value	Public funding of innovation	Organisational and marketing innovations		
Country	Country	Total number of enterprises in the population in 2004	Product, developed by enterprise or group	Product, developed in cooperation with other enterprises or institutions	Product, developed mainly by other enterprises or institutions	Process, developed by enterprise or group	Process, developed in cooperation with other enterprises or institutions	Process, developed mainly by other enterprises or institutions	Total innovation expenditure	Enterprises, engaged in intramural R&D	Engaged in extramural R&D	Enterprises, engaged in acquisition of machinery, equipment and software	Enterprises, engaged in other external knowledge	Enterprises, engagement in training	Enterprises, engaged in market introduction of innovation	Enterprises, engaged in other preparations	Expenditure in intramural R&D in 2004	Expenditure in extramural R&D in 2004	Expenditure for acquisition of machinery, equipment and software in 2004	Expenditure for acquisition of other external knowledge in 2004	All types of co-operation	Enterprise that received any public funding	Enterprise introduced organisational and/or marketing innovations	Enterprise introduced organisational innovation	Enterprise introduced marketing innovation
Austria	AT	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X
Belgium	BE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Bulgaria	BG	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X
Cyprus	CY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Czech Republ	CZ	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Germany (in	DE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Denmark	DK	X	X	-	-	X	-	-	-	X	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
Estonia	EE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Spain	ES	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Finland	FI	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-
France	FR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Greece	GR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hungary	HU	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ireland	IE	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	X	X	X	-	X	-	X	-	X
Iceland	IS	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-
Italy	IT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lithuania	LT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Luxembourg	LU	X	X	X	-	X	X	X	-	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X
Latvia	LV	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-
Malta	MT	X	X	X	-	X	-	-	X	-	-	X	X	X	X	X	-	-	X	X	X	-	X	X	X
Netherlands	NL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Norway	NO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Poland	PL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	-	X	X	X	X	X
Portugal	PT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Romania	RO	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sweden	SE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
Slovenia	SI	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-
Slovakia	SK	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Turkey	TR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-
United Kingd	UK	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-

Table A.3.2.2.4.g – Data availability for CIS4 indicators – Sector J (macro dataset)

		Product and process innovation							Innovation activity and expenditure in 2004												Innovation co-operation during 2002-2004 in absolute value	Public funding of innovation	Organisational and marketing innovations		
Country	Country	Total number of enterprises in the population in 2004	Product, developed by enterprise or group	Product, developed in cooperation with other enterprises or institutions	Product, developed mainly by other enterprises or institutions	Process, developed by enterprise or group	Process, developed in cooperation with other enterprises or institutions	Process, developed mainly by other enterprises or institutions	Total innovation expenditure	Enterprises, engaged in intramural R&D	Engaged in extramural R&D	Enterprises, engaged in acquisition of machinery, equipment and software	Enterprises, engaged in other external knowledge	Enterprises, engagement in training	Enterprises, engaged in market introduction of innovation	Enterprises, engaged in other preparations	Expenditure in intramural R&D in 2004	Expenditure in extramural R&D in 2004	Expenditure for acquisition of machinery, equipment and software in 2004	Expenditure for acquisition of other external knowledge in 2004	All types of co-operation	Enterprise that received any public funding	Enterprise introduced organisational and/or marketing innovations	Enterprise introduced organisational innovation	Enterprise introduced marketing innovation
Austria	AT	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X
Belgium	BE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Bulgaria	BG	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cyprus	CY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Czech Republ	CZ	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Germany (in	DE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Denmark	DK	X	X	-	-	X	-	-	X	X	X	X	X	X	X	X	-	-	-	-	X	-	X	X	X
Estonia	EE	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Spain	ES	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Finland	FI	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-
France	FR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Greece	GR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hungary	HU	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ireland	IE	-	X	X	X	X	X	X	X	X	-	-	X	-	-	-	-	-	X	X	-	-	-	X	-
Iceland	IS	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-
Italy	IT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lithuania	LT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Luxembourg	LU	X	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Latvia	LV	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-
Malta	MT	X	X	-	-	X	X	-	X	X	-	X	-	X	X	X	X	-	X	-	X	-	X	X	X
Netherlands	NL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Norway	NO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Poland	PL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	-	X	X	X	X	X
Portugal	PT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Romania	RO	X	X	X	-	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X
Sweden	SE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	-	-	-	-
Slovenia	SI	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Slovakia	SK	X	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X
Turkey	TR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-
United Kingd	UK	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-

Table A.3.2.2.4.h– Data availability for CIS4 indicators – Sector K (macro dataset)

		Product and process innovation							Innovation activity and expenditure in 2004												Innovation co-operation during 2002-2004 in absolute value	Public funding of innovation	Organisational and marketing innovations		
Country	Country	Total number of enterprises in the population in 2004	Product, developed by enterprise or group	Product, developed in cooperation with other enterprises or institutions	Product, developed mainly by other enterprises or institutions	Process, developed by enterprise or group	Process, developed in cooperation with other enterprises or institutions	Process, developed mainly by other enterprises or institutions	Total innovation expenditure	Enterprises, engaged in intramural R&D	Engaged in extramural R&D	Enterprises, engaged in acquisition of machinery, equipment and software	Enterprises, engaged in other external knowledge	Enterprises, engagement in training	Enterprises, engaged in market introduction of innovation	Enterprises, engaged in other preparations	Expenditure in intramural R&D in 2004	Expenditure in extramural R&D in 2004	Expenditure for acquisition of machinery, equipment and software in 2004	Expenditure for acquisition of other external knowledge in 2004	All types of co-operation	Enterprise that received any public funding	Enterprise introduced organisational and/or marketing innovations	Enterprise introduced organisational innovation	Enterprise introduced marketing innovation
Austria	AT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Belgium	BE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Bulgaria	BG	X	X	-	X	-	-	X	X	X	X	X	X	-	-	-	X	-	-	-	X	X	-	-	-
Cyprus	CY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Czech Republ	CZ	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Germany (in	DE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-
Denmark	DK	X	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X
Estonia	EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spain	ES	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Finland	FI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
France	FR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Greece	GR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	HU	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ireland	IE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iceland	IS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Italy	IT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lithuania	LT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Luxembourg	LU	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Latvia	LV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Malta	MT	X	X	-	-	X	-	-	X	X	-	X	-	X	X	X	X	-	X	-	X	-	X	X	X
Netherlands	NL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X
Norway	NO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Poland	PL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	X	X	X	X	X
Portugal	PT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Romania	RO	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-
Sweden	SE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
Slovenia	SI	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Slovakia	SK	X	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Turkey	TR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-
United Kingd	UK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A.3.2.3 – Data availability for CIS2006 indicators (macro dataset)

	Product and process innovation							Innovation activity and expenditure in 2006												Innovation co-operation during 2004-2006	Public funding of innovation	Organisational and marketing innovations
Country	Total number of enterprises in the population in 2006	Product, developed by enterprise or group	Product, developed in cooperation with other enterprises or institutions	Product, developed mainly by other enterprises or institutions	Process, developed by enterprise or group	Process, developed in cooperation with other enterprises or institutions	Process, developed mainly by other enterprises or institutions	Total innovation expenditure	Enterprises, engaged in intramural R&D	Engaged in extramural R&D	Enterprises, engaged in acquisition of machinery, equipment and software	Enterprises, engaged in other external knowledge	Enterprises, engagement in training	Enterprises, engaged in market introduction of innovation	Enterprises, engaged in other preparations	Expenditure in intramural R&D in 2006	Expenditure in extramural R&D in 2006	Expenditure for acquisition of machinery, equipment and software in 2006	Expenditure for acquisition of other external knowledge in 2006	All types of co-operation	Enterprise that received any public funding	Enterprise introduced organisational and/or marketing innovations
AT	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	-	-	-	-	X	X	X
BE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BG	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CZ	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DE	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	X	X	X
DK	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X
EE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ES	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-
FI	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X
FR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
HU	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
IE	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	X	X	X	X	X	-	-
IS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IT	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-
LT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LU	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LV	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X
MT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NO	X	X	X	X	X	X	X	-	X	X	-	-	-	-	-	X	X	-	-	X	-	X
PL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
RO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SE	X	X	X	-	X	X	-	X	X	X	X	-	X	X	X	X	-	X	X	X	-	-
SI	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SK	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-
TR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
UK	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-

Table A.3.2.4 – Data availability for innovation diffusion indicator (micro dataset)

1998-2000						
Country	**Adoption rate**	**Sectors missed**	**Product Adoption rate**	**Sectors missed**	**Process Adoption rate**	**Sectors missed**
AT	X	C E	X	C E	X	C E
BE	X		X		X	
BG	X	E	X	E	X	E
CY	-		-		-	
CZ	X		X		X	
DE	X		X		X	
DK	-		-		-	
EE	X		X		X	
ES	X		X		X	
FI	X	J	X	J	X	J
FR	X	I J	X		X	
GR	X	C E	X	C E	X	C E
HU	X	C	X	C	X	C
IE	-		-		-	
IT	X		X		X	
LT	X		X		X	
LU	X	C D E	X	C D E	X	C D E
LV	X		X		X	
NL	X		X		X	
NO	X		X		X	
PL	-		-		-	
PT	X		X		X	
RO	X		X		X	
SE	X		X		X	
SI	-		-		-	
SK	X		X		X	

Table A.3.2.5 – Data availability for innovation diffusion indicator (micro dataset)

	2002-2004					
Country	Adoption rate	Sectors missed	Product Adoption rate	Sectors missed	Process Adoption rate	Sectors missed
AT	X	C E G K	X	C E G K	X	C E G K
BE	X		X	C	X	
BG	X		X		X	
CY	X		X	E	X	
CZ	X		X		X	
DE	X	G K	X	G K	X	G K
DK	X	C E I J K	X	C E I J K	X	C E I J
EE	X		X	C	X	
ES	X		X		X	
FI	X	C E G K	X	C E G K	X	C E G K
FR	X	C E	X	C E	X	C E
GR	X	G K	X	G K	X	G K
HU	X		X	C	X	
IE	X	C E G J K	X	G K	X	G K
IT	X		X		X	
LT	X		X		X	
LU	X	C E I J	X	C E I J	X	C E
LV	X		X		X	
NL	X	C E	X	C E	X	C
NO	X		X		X	
PL	X	C	X	C	X	
PT	X		X		X	
RO	X	C E I J K	X	C E J	X	I
SE	X	C E	X	C E	X	C E
SI	X	C	X	C	X	C
SK	X		X	C	X	

Table A.3.2.6 - RIS data 2004

		1.1.3 Tertiary education 2004	1.1.4 Life-long learning 2004	1.2.4 Broadband access 2004	1.2.1 Public R&D expenditures 2004	2.1.1 Business R&D expenditures 2004	2.1.3 Non-R&D innovation expenditures 2004	2.2.1 SMEs innovating in-house 2004	2.2.2 Innovative SMEs collaborating with others 2004	2.3.1 EPO patents 2004	3.1.1 Product and/or process innovators 2004	3.1.2 Marketing and/or organisational innovators 2004	3.1.3a Resource efficiency innovators - Labour 2004	3.1.3b Resource efficiency innovators - Energy 2004	3.2.1 Employment medium-high & high-tech manufacturing 2004	3.2.2 Employment knowledge-intensive services 2004	3.2.5 New-to-market sales 2004	3.2.6 New-to-firm sales 2004
BE	NUTS1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
BG	NUTS1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
CZ	NUTS2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
DK	NUTS0	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
DE	NUTS2	x	x	x	x	x	--	--	--	x	--	--	--	--	x	x	--	--
EE	NUTS0	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
IE	NUTS2	x	x	x	x	x	--	--	--	x	--	--	--	--	x	x	--	--
GR	NUTS1	x	x	x	x	x	--	--	--	x	--	--	--	--	x	x	--	--
ES	NUTS2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
FR	NUTS1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
IT	NUTS2	x	x	x	x	x	--	x	x	x	x	x	x	x	x	x	--	--
CY	NUTS0	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
LV	NUTS0	x	x	x	x	x	--	--	x	x	--	--	x	x	x	x	x	x
LT	NUTS0	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
LU	NUTS0	x	x	x	x	x	x	--	x	x	x	x	x	x	x	x	x	x
HU	NUTS2	x	x	x	x	x	--	--	--	x	--	--	--	--	x	x	--	--
MT	NUTS0	x	x	x	x	x	x	--	x	x	--	--	--	--	x	x	x	x
NL	NUTS2	x	x	x	x	x	--	--	--	x	--	--	--	--	x	x	--	--
AT	NUTS1	x	x	x	x	x	--	x	x	x	x	x	x	x	x	x	--	--
PL	NUTS2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
PT	NUTS2	x	x	x	x	x	x	x	x	x	x	x	--	--	x	x	x	x
RO	NUTS2	x	x	--	x	x	x	x	x	--	x	x	x	--	x	x	x	x
SI	NUTS2	--	--	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
SK	NUTS2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
FI	NUTS2	x	x	x	x	x	--	x	x	x	x	x	x	x	x	x	--	--
SE	NUTS2	x	x	x	x	x	--	--	--	x	--	--	--	--	x	x	--	--
UK	NUTS1	x	x	x	x	x	--	x	x	x	x	x	x	x	x	x	--	--
NO	NUTS2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Legenda:
X = data available; -- = data missing
Data available at NUTS0: DK, CY, EE, LV, LT, LU, MT
Data available at NUTS1: AT, BE, BG, GR FR, UK
Data available at NUTS2

Table A.3.2.7 - RIS data 2006

		1.1.3 Tertiary education 2006	1.1.4 Life-long learning 2006	1.2.4 Broadband access 2006	1.2.1 Public R&D expenditures 2006	2.1.1 Business R&D expenditures 2006	2.1.3 Non-R&D innovation expenditures 2006	2.2.1 SMEs innovating in-house 2006	2.2.2 Innovative SMEs collaborating with others 2006	2.3.1 EPO patents 2006	3.1.1 Product and/or process innovators 2006	3.1.2 Marketing and/or organisational innovators 2006	3.1.3a Resource efficiency innovators - Labour 2006	3.1.3b Resource efficiency innovators - Energy 2006	3.2.1 Employment medium-high & high-tech manufacturing 2006	3.2.2 Employment knowledge-intensive services 2006	3.2.5 New-to-market sales 2006	3.2.6 New-to-firm sales 2006
BE	NUTS1	x	x	x	x	x	x	x	x	x	x	x	--	--	x	x	x	x
BG	NUTS1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
CZ	NUTS2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
DK	NUTS0	x	x	x	x	x	x	--	x	x	x	x	x	x	x	x	x	x
DE	NUTS2	x	x	x	x	x	--	--	--	x	--	--	--	--	x	x	--	--
EE	NUTS0	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
IE	NUTS2	x	x	x	x	x	--	--	--	x	--	--	--	--	x	x	--	--
GR	NUTS1	x	x	x	x	x	--	--	--	x	--	--	--	--	x	x	--	--
ES	NUTS2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
FR	NUTS1	x	x	x	x	x	--	--	--	x	--	--	--	--	x	x	--	--
IT	NUTS2	x	x	x	x	x	--	--	--	x	--	--	--	--	x	x	--	--
CY	NUTS0	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
LV	NUTS0	x	x	x	x	x	--	--	x	x	x	--	x	x	x	x	x	x
LT	NUTS0	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
LU	NUTS0	x	x	x	x	x	x	--	x	x	x	x	x	x	x	x	x	x
HU	NUTS2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
MT	NUTS0	x	x	x	x	x	x	--	x	x	--	x	x	x	x	x	x	x
NL	NUTS2	x	x	x	x	x	--	--	--	x	--	--	--	--	x	x	--	--
AT	NUTS1	x	x	x	x	x	--	x	x	x	x	x	x	x	x	x	--	--
PL	NUTS2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
PT	NUTS2	x	x	x	x	x	x	x	x	x	x	x	--	--	x	x	x	x
RO	NUTS2	x	x	--	x	x	x	x	x	--	x	x	x	x	x	x	x	x
SI	NUTS2	--	--	x	x	x	x	x	x	x	x	--	--	--	x	x	x	x
SK	NUTS2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
FI	NUTS2	x	x	x	x	x	--	x	x	x	x	x	x	x	x	x	--	--
SE	NUTS2	x	x	x	x	x	--	--	--	x	--	--	--	--	x	x	--	--
UK	NUTS1	x	x	x	x	x	--	x	x	x	x	x	x	x	x	x	--	--
NO	NUTS2	x	x	x	x	x	--	x	x	x	x	--	--	--	x	x	x	x

Legenda:
X = data available; -- = data missing
Data available at NUTS0: DK, CY, EE, LV, LT, LU, MT
Data available at NUTS1: AT, BE, BG, GR FR, UK
Data available at NUTS2

Table A.3.2.8. List of variables, description and source

name	Description	source
R&D expenditure	Total intramural R&D expenditure (GERD) by region (last year available 2007)	Eurostat and Institut National de la Statistique et des Études Économiques (France)
R&D personnel	Total R&D personnel and researchers by region (last year available 2007)	Eurostat
patents	number of patent applications filed to the EPO, regionalized according to the inventors' residence. Years: from 1980 to 2007. For the list of available sectors for patents please refer to Table 4	CRENoS elaboration on *OECD, REGPAT database, January 2010*
citations made	number of citations reported in patent applications filed to the EPO. Years: from 1980 to 2005. For the list of available sectors for citations data please refer to Table 4	CRENoS elaboration on *OECD/EPO patent citations database, 2004* and *OECD, REGPAT database, January 2010*
citations received	number of citations for EPO patents and for patents of national offices of China, Japan and United States. All citations derive from EPO patents. Years: from 1980 to 2005.	CRENoS elaboration on *OECD/EPO patent citations database, 2004* and *OECD, REGPAT database, January 2010*
5th FP	European financing for participants at 5th Framework Programme projects (1998-2002). In case of multiple participants a proportional quote was attribuited.	CRENoS elaboration on European Commission CORDIS (2002) *Fifth framework programme*
6th FP	European financing for participants at 6th Framework Programme projects (2003-2007). In case of multiple participants a proportional quote was attribuited.	CRENoS elaboration on European Commission CORDIS (2007) *Sixth framework programme*

Table A.3.2.9. R&D data availability

Code	R&D expenditure (last year available 2007)	R&D personnel (last year available 2007)
AT11	Available	Available
AT12	Available	Available
AT13	Available	Available
AT21	Available	Available
AT22	Available	Available
AT31	Available	Available
AT32	Available	Available
AT33	Available	Available
AT34	Available	Available
BE10	Available	Available
BE21	Nuts1 data available	Nuts1 data available
BE22	Nuts1 data available	Nuts1 data available
BE23	Nuts1 data available	Nuts1 data available
BE24	Nuts1 data available	Nuts1 data available
BE25	Nuts1 data available	Nuts1 data available
BE31	Nuts1 data available	Nuts1 data available
BE32	Nuts1 data available	Nuts1 data available
BE33	Nuts1 data available	Nuts1 data available
BE34	Nuts1 data available	Nuts1 data available
BE35	Nuts1 data available	Nuts1 data available
BG31	Available	Available
BG32	Available	Available
BG33	Available	Available
BG34	Available	Available
BG41	Available	Available

BG42	Available	Available
CH01	National data available for 2004	National data available for 2004
CH02	National data available for 2004	National data available for 2004
CH03	National data available for 2004	National data available for 2004
CH04	National data available for 2004	National data available for 2004
CH05	National data available for 2004	National data available for 2004
CH06	National data available for 2004	National data available for 2004
CH07	National data available for 2004	National data available for 2004
CY00	Available	Available
CZ01	Available	Available
CZ02	Available	Available
CZ03	Available	Available
CZ04	Available	Available
CZ05	Available	Available
CZ06	Available	Available
CZ07	Available	Available
CZ08	Available	Available
DE11	Available	Available
DE12	Available	Available
DE13	Available	Available
DE14	Available	Available
DE21	Available	Available
DE22	The latest available data is 1997	Nuts1 data available
DE23	The latest available data is 1997	Nuts1 data available
DE24	Available	Available
DE25	Available	Available
DE26	Available	Available
DE27	Available	Available
DE30	Available	Available
DE41	Available	Data available for 2005
DE42	Available	Data available for 2005
DE50	Available	Available
DE60	Available	Available
DE71	Available	Available
DE72	Available	Available
DE73	Available	Available
DE80	Available	Available
DE91	Available	Available
DE92	Available	Available
DE93	Available	Available
DE94	Available	Available
DEA1	Available	Available
DEA2	Available	Available
DEA3	Available	Available
DEA4	Available	Available
DEA5	Available	Available
DEB1	Available	Available
DEB2	Available	Available
DEB3	Available	Available
DEC0	Available	Available
DED1	Available	Available
DED2	Available	Available
DED3	Available	Available
DEE0	Available	Available
DEF0	Available	Available
DEG0	Available	Available
DK01	Available	Available
DK02	Available	Available
DK03	Available	Available
DK04	Available	Available
DK05	Available	Available
EE00	Available	Available
ES11	Available	Available
ES12	Available	Available

ES13	Available	Available
ES21	Available	Available
ES22	Available	Available
ES23	Available	Available
ES24	Available	Available
ES30	Available	Available
ES41	Available	Available
ES42	Available	Available
ES43	Available	Available
ES51	Available	Available
ES52	Available	Available
ES53	Available	Available
ES61	Available	Available
ES62	Available	Available
ES63	Available	Available
ES64	Available	Available
ES70	Available	Available
FI13	Available	Available
FI18	Available	Available
FI19	Available	Available
FI1A	Available	Available
FI20	Available	Available
FR10	Available data 2006	Data available for 2004
FR21	Available data 2006	Data available for 2004
FR22	Available data 2006	Data available for 2004
FR23	Available data 2006	Data available for 2004
FR24	Available data 2006	Data available for 2004
FR25	Available data 2006	Data available for 2004
FR26	Available data 2006	Data available for 2004
FR30	Available data 2006	Data available for 2004
FR41	Available data 2006	Data available for 2004
FR42	Available data 2006	Data available for 2004
FR43	Available data 2006	Data available for 2004
FR51	Available data 2006	Data available for 2004
FR52	Available data 2006	Data available for 2004
FR53	Available data 2006	Data available for 2004
FR61	Available data 2006	Data available for 2004
FR62	Available data 2006	Data available for 2004
FR63	Available data 2006	Data available for 2004
FR71	Available data 2006	Data available for 2004
FR72	Available data 2006	Data available for 2004
FR81	Available data 2006	Data available for 2004
FR82	Available data 2006	Data available for 2004
FR83	Available data 2006	Data available for 2004
FR91	Available Nuts1 data for 2006	Nuts1 data available for 2004
FR92	Available Nuts1 data for 2006	Nuts1 data available for 2004
FR93	Available Nuts1 data for 2006	Nuts1 data available for 2004
FR94	Available Nuts1 data for 2006	Nuts1 data available for 2004
GR11	Data available for 2005	Nuts1 data available for 2004
GR12	Data available for 2005	Nuts1 data available for 2004
GR13	Data available for 2005	Nuts1 data available for 2004
GR14	Data available for 2005	Nuts1 data available for 2004
GR21	Data available for 2005	Nuts1 data available for 2004
GR22	Data available for 2005	Nuts1 data available for 2004
GR23	Data available for 2005	Nuts1 data available for 2004
GR24	Data available for 2005	Nuts1 data available for 2004
GR25	Data available for 2005	Nuts1 data available for 2004
GR30	Data available for 2005	Nuts1 data available for 2004
GR41	Data available for 2005	Nuts1 data available for 2004
GR42	Data available for 2005	Nuts1 data available for 2004
GR43	Data available for 2005	Nuts1 data available for 2004
HU10	Available	Available
HU21	Available	Available
HU22	Available	Available

HU23	Available	Available
HU31	Available	Available
HU32	Available	Available
HU33	Available	Available
IE01	Available	Available
IE02	Available	Available
IS00	Available	Available
ITC1	Data available for 2005	Data available for 2005
ITC2	Data available for 2005	Data available for 2005
ITC3	Data available for 2005	Data available for 2005
ITC4	Data available for 2005	Data available for 2005
ITD1	Data available for 2005	Data available for 2005
ITD2	Data available for 2005	Data available for 2005
ITD3	Data available for 2005	Data available for 2005
ITD4	Data available for 2005	Data available for 2005
ITD5	Data available for 2005	Data available for 2005
ITE1	Data available for 2005	Data available for 2005
ITE2	Data available for 2005	Data available for 2005
ITE3	Data available for 2005	Data available for 2005
ITE4	Data available for 2005	Data available for 2005
ITF1	Data available for 2005	Data available for 2005
ITF2	Data available for 2005	Data available for 2005
ITF3	Data available for 2005	Data available for 2005
ITF4	Data available for 2005	Data available for 2005
ITF5	Data available for 2005	Data available for 2005
ITF6	Data available for 2005	Data available for 2005
ITG1	Data available for 2005	Data available for 2005
ITG2	Data available for 2005	Data available for 2005
LI00	Missing	Missing
LT00	Available	Available
LU00	Available	Available
LV00	Available	Available
MT00	Available	Available
NL11	Data available for 2003	Data available for 2003
NL12	Data available for 2003	Data available for 2003
NL13	Data available for 2003	Data available for 2003
NL21	Data available for 2003	Data available for 2003
NL22	Data available for 2003	Data available for 2003
NL23	Data available for 2003	Data available for 2003
NL31	Data available for 2003	Data available for 2003
NL32	Data available for 2003	Data available for 2003
NL33	Data available for 2003	Data available for 2003
NL34	Data available for 2003	Data available for 2003
NL41	Data available for 2003	Data available for 2003
NL42	Data available for 2003	Data available for 2003
NO01	Available	Available
NO02	Available	Available
NO03	Available	Available
NO04	Available	Available
NO05	Available	Available
NO06	Available	Available
NO07	Available	Available
PL11	Available	Available
PL12	Available	Available
PL21	Available	Available
PL22	Available	Available
PL31	Available	Available
PL32	Available	Available
PL33	Available	Available
PL34	Available	Available
PL41	Available	Available
PL42	Available	Available
PL43	Available	Available
PL51	Available	Available

PL52	Available	Available
PL61	Available	Available
PL62	Available	Available
PL63	Available	Available
PT11	Available	Available
PT15	Available	Available
PT16	Available	Available
PT17	Available	Available
PT18	Available	Available
PT20	Available	Available
PT30	Available	Available
RO11	Available	Available
RO12	Available	Available
RO21	Available	Available
RO22	Available	Available
RO31	Available	Available
RO32	Available	Available
RO41	Available	Available
RO42	Available	Available
SE11	Available	Available
SE12	Available	Available
SE21	Available	Available
SE22	Available	Available
SE23	Available	Available
SE31	Available	Available
SE32	Available	Available
SE33	Available	Available
SI01	Available	Available
SI02	Available	Available
SK01	Available	Available
SK02	Available	Available
SK03	Available	Available
SK04	Available	Available
UKC1	Available	Available
UKC2	Available	Available
UKD1	Available	Available
UKD2	Available	Available
UKD3	Available	Available
UKD4	Available	Available
UKD5	Available	Available
UKE1	Available	Available
UKE2	Available	Available
UKE3	Available	Available
UKE4	Available	Available
UKF1	Available	Available
UKF2	Available	Available
UKF3	Available	Available
UKG1	Available	Available
UKG2	Available	Available
UKG3	Available	Available
UKH1	Available	Available
UKH2	Available	Available
UKH3	Available	Available
UKI1	Available	Available
UKI2	Available	Available
UKJ1	Available	Available
UKJ2	Available	Available
UKJ3	Available	Available
UKJ4	Available	Available
UKK1	Available	Available
UKK2	Available	Available
UKK3	Available	Available
UKK4	Available	Available
UKL1	Available	Available

UKL2	Available	Available
UKM2	Available	Available
UKM3	Available	Available
UKM5	Available	Available
UKM6	Available	Available
UKN0	Available	Available

Table A3.2.10.Patents, Patent citations and FP data availability

Code	patents (1980-2007)	citations made (1980-2005)	citations received (1980-2005)	5th FP	6th FP
AT11	available	available	available	available	national data available
AT12	available	available	available	available	national data available
AT13	available	available	available	available	national data available
AT21	available	available	available	available	national data available
AT22	available	available	available	available	national data available
AT31	available	available	available	available	national data available
AT32	available	available	available	available	national data available
AT33	available	available	available	available	national data available
AT34	available	available	available	available	national data available
BE10	available	available	available	available	national data available
BE21	available	available	available	available	national data available
BE22	available	available	available	available	national data available
BE23	available	available	available	available	national data available
BE24	available	available	available	available	national data available
BE25	available	available	available	available	national data available
BE31	available	available	available	available	national data available
BE32	available	available	available	available	national data available
BE33	available	available	available	available	national data available
BE34	available	available	available	available	national data available
BE35	available	available	available	available	national data available
BG31	available	available	available	available	national data available
BG32	available	available	available	available	national data available
BG33	available	available	available	available	national data available
BG34	available	available	available	available	national data available
BG41	available	available	available	available	national data available
BG42	available	available	available	available	national data available
CH01	available	available	available	available	national data available
CH02	available	available	available	available	national data available
CH03	available	available	available	available	national data available
CH04	available	available	available	available	national data available
CH05	available	available	available	available	national data available
CH06	available	available	available	available	national data available
CH07	available	available	available	available	national data available
CY00	available	available	available	available	national data available
CZ01	available	available	available	available	national data available
CZ02	available	available	available	available	national data available
CZ03	available	available	available	available	national data available
CZ04	available	available	available	available	national data available
CZ05	available	available	available	available	national data available
CZ06	available	available	available	available	national data available
CZ07	available	available	available	available	national data available
CZ08	available	available	available	available	national data available
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DE14	available	available	available	available	national data available
DE21	available	available	available	available	national data available
DE22	available	available	available	available	national data available
DE23	available	available	available	available	national data available
DE24	available	available	available	available	national data available
DE25	available	available	available	available	national data available

DE26	available	available	available	available	national data available
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DE42	available	available	available	available	national data available
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DE72	available	available	available	available	national data available
DE73	available	available	available	available	national data available
DE80	available	available	available	available	national data available
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DE92	available	available	available	available	national data available
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DE94	available	available	available	available	national data available
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DEA3	available	available	available	available	national data available
DEA4	available	available	available	available	national data available
DEA5	available	available	available	available	national data available
DEB1	available	available	available	available	national data available
DEB2	available	available	available	available	national data available
DEB3	available	available	available	available	national data available
DEC0	available	available	available	available	national data available
DED1	available	available	available	available	national data available
DED2	available	available	available	available	national data available
DED3	available	available	available	available	national data available
DEE0	available	available	available	available	national data available
DEF0	available	available	available	available	national data available
DEG0	available	available	available	available	national data available
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DK03	available	available	available	available	national data available
DK04	available	available	available	available	national data available
DK05	available	available	available	available	national data available
EE00	available	available	available	available	national data available
ES11	available	available	available	available	national data available
ES12	available	available	available	available	national data available
ES13	available	available	available	available	national data available
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ES64	available	available	available	available	national data available
ES70	available	available	available	available	national data available
FI13	available	available	available	available	national data available
FI18	available	available	available	available	national data available
FI19	available	available	available	available	national data available
FI1A	available	available	available	available	national data available
FI20	available	available	available	available	national data available
FR10	available	available	available	available	national data available
FR21	available	available	available	available	national data available
FR22	available	available	available	available	national data available
FR23	available	available	available	available	national data available

FR24	available	available	available	available	national data available
FR25	available	available	available	available	national data available
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FR41	available	available	available	available	national data available
FR42	available	available	available	available	national data available
FR43	available	available	available	available	national data available
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FR52	available	available	available	available	national data available
FR53	available	available	available	available	national data available
FR61	available	available	available	available	national data available
FR62	available	available	available	available	national data available
FR63	available	available	available	available	national data available
FR71	available	available	available	available	national data available
FR72	available	available	available	available	national data available
FR81	available	available	available	available	national data available
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FR83	available	available	available	available	national data available
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FR92	available	available	available	available	national data available
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GR41	available	available	available	available	national data available
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HU21	available	available	available	available	national data available
HU22	available	available	available	available	national data available
HU23	available	available	available	available	national data available
HU31	available	available	available	available	national data available
HU32	available	available	available	available	national data available
HU33	available	available	available	available	national data available
IE01	available	available	available	available	national data available
IE02	available	available	available	available	national data available
IS00	available	available	available	available	national data available
ITC1	available	available	available	available	national data available
ITC2	available	available	available	available	national data available
ITC3	available	available	available	available	national data available
ITC4	available	available	available	available	national data available
ITD1	available	available	available	available	national data available
ITD2	available	available	available	available	national data available
ITD3	available	available	available	available	national data available
ITD4	available	available	available	available	national data available
ITD5	available	available	available	available	national data available
ITE1	available	available	available	available	national data available
ITE2	available	available	available	available	national data available
ITE3	available	available	available	available	national data available
ITE4	available	available	available	available	national data available
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ITF2	available	available	available	available	national data available
ITF3	available	available	available	available	national data available
ITF4	available	available	available	available	national data available
ITF5	available	available	available	available	national data available
ITF6	available	available	available	available	national data available

ITG1	available	available	available	available	national data available
ITG2	available	available	available	available	national data available
LI00	available	available	available	available	national data available
LT00	available	available	available	available	national data available
LU00	available	available	available	available	national data available
LV00	available	available	available	available	national data available
MT00	available	available	available	available	national data available
NL11	available	available	available	available	national data available
NL12	available	available	available	available	national data available
NL13	available	available	available	available	national data available
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NL33	available	available	available	available	national data available
NL34	available	available	available	available	national data available
NL41	available	available	available	available	national data available
NL42	available	available	available	available	national data available
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NO02	available	available	available	available	national data available
NO03	available	available	available	available	national data available
NO04	available	available	available	available	national data available
NO05	available	available	available	available	national data available
NO06	available	available	available	available	national data available
NO07	available	available	available	available	national data available
PL11	available	available	available	available	national data available
PL12	available	available	available	available	national data available
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PL43	available	available	available	available	national data available
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PL52	available	available	available	available	national data available
PL61	available	available	available	available	national data available
PL62	available	available	available	available	national data available
PL63	available	available	available	available	national data available
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PT15	available	available	available	available	national data available
PT16	available	available	available	available	national data available
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PT18	available	available	available	available	national data available
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RO22	available	available	available	available	national data available
RO31	available	available	available	available	national data available
RO32	available	available	available	available	national data available
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SE12	available	available	available	available	national data available
SE21	available	available	available	available	national data available
SE22	available	available	available	available	national data available
SE23	available	available	available	available	national data available
SE31	available	available	available	available	national data available
SE32	available	available	available	available	national data available

SE33	available	available	available	available	national data available
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SK01	available	available	available	available	national data available
SK02	available	available	available	available	national data available
SK03	available	available	available	available	national data available
SK04	available	available	available	available	national data available
UKC1	available	available	available	available	national data available
UKC2	available	available	available	available	national data available
UKD1	available	available	available	available	national data available
UKD2	available	available	available	available	national data available
UKD3	available	available	available	available	national data available
UKD4	available	available	available	available	national data available
UKD5	available	available	available	available	national data available
UKE1	available	available	available	available	national data available
UKE2	available	available	available	available	national data available
UKE3	available	available	available	available	national data available
UKE4	available	available	available	available	national data available
UKF1	available	available	available	available	national data available
UKF2	available	available	available	available	national data available
UKF3	available	available	available	available	national data available
UKG1	available	available	available	available	national data available
UKG2	available	available	available	available	national data available
UKG3	available	available	available	available	national data available
UKH1	available	available	available	available	national data available
UKH2	available	available	available	available	national data available
UKH3	available	available	available	available	national data available
UKI1	available	available	available	available	national data available
UKI2	available	available	available	available	national data available
UKJ1	available	available	available	available	national data available
UKJ2	available	available	available	available	national data available
UKJ3	available	available	available	available	national data available
UKJ4	available	available	available	available	national data available
UKK1	available	available	available	available	national data available
UKK2	available	available	available	available	national data available
UKK3	available	available	available	available	national data available
UKK4	available	available	available	available	national data available
UKL1	available	available	available	available	national data available
UKL2	available	available	available	available	national data available
UKM2	available	available	available	available	national data available
UKM3	available	available	available	available	national data available
UKM5	available	available	available	available	national data available
UKM6	available	available	available	available	national data available
UKN0	available	available	available	available	national data available
China			available		
Japan			available		
USA			available		

Table A.3.2.11. List of sectors for patents and citations data

sector	sector description	NACE level3	NACE level2	ISIC
01	Food, beverages	15	DA	15
02	Tobacco products	16	DA	16
03	Textiles	17	DB	17
04	Wearing apparel	18	DB	18
05	Leather articles	19	DC	19
06	Wood products	20	DD	20
07	Paper	21	DE	21
08	Publishing, printing	22	DE	22
09	Petroleum products, nuclear fuel	23	DF	23
10	Basic chemicals	24.1	DG	241
11	Pesticides & agro-chemical products	24.2	DG	2421
12	Paints, varnishes	24.3	DG	2422
13	Pharmaceuticals	24.4	DG	2423
14	Soaps & detergents	24.5	DG	2424
15	Other chemicals	24.6	DG	2429
16	Man-made fibres	24.7	DG	243
17	Rubber and plastics products	25	DH	25
18	Non-metallic mineral products	26	DI	26
19	Basic metals	27	DJ	27
20	Fabricated metal products	28	DJ	28
21	Energy machinery	29.1	DK	2911, 2912, 2913
22	Non-specific purpose machinery	29.2	DK	2914, 2915, 2919
23	Agricultural & forestry machinery	29.3	DK	2921
24	Machine-tools	29.4	DK	2922
25	Special purpose machinery	29.5	DK	2923, 2924, 2925, 2926, 2929
26	Weapons and ammunition	29.6	DK	2927
27	Domestic appliances	29.7	DK	293
28	Office machinery and computers	30	DL	30
29	Electric motors, generators	31.1	DL	311
30	Electric distribution, control, wire, cable	31.2, 31.3	DL	312, 313
31	Accumaulators, battery	31.4	DL	314
32	Lightening equipment	31.5	DL	315
33	Other electrical equipment	31.6	DL	319
34	Electronic components	32.1	DL	321
35	Signal transmission, telecommunications	32.2	DL	322
36	TV and radio receivers, audiovisual electronics	32.3	DL	323
37	Medical equipment	33.1	DL	3311
38	Measuring instruments	33.2	DL	3312
39	Industrial process control equipment	33.3	DL	3313
40	Optical instruments	33.4	DL	332
41	Watches, clocks	33.5	DL	333
42	Motor vehicles	34	DM	34
43	Other transport equipment	35	DM	35-353
44	Furniture, consumer goods	36	DN	36

Table A.3.2.12. Geographical coverage for China

Provincial Subdivisions	DATA AVAILABLE
Anhui	YES
Beijing	YES
Chongqing	YES
Fujian	YES
Gansu	YES
Guangdong	YES
Guangxi	YES
Guizhou	YES
Hainan	YES
Hebei	YES
Heilongjiang	YES
Henan	YES
Hubei	YES
Hunan	YES
Inner Mongolia	YES
Jiangsu	YES
Jiangxi	YES
Jilin	YES
Liaoning	YES
Ningxia	YES
Qinghai	YES
Shaanxi	YES
Shandong	YES
Shanghai	YES
Shanxi	YES
Sichuan	YES
Tianjin	YES
Xinjiang	YES
Yunnan	YES
Zhejiang	YES
Hong Kong (SAR)	NO
Macau (SAR)	NO
Tibet (AR)	NO

Table A.3.2.13. Geographical coverage for India

States of India	DATA AVAILABLE
Andhra Pradesh	YES
Arunachal Pradesh	NO
Assam	NO
Bihar	YES
Chhattisgarh	NO
Goa	YES
Gujarat	YES
Haryana	YES
Himachal Pradesh	YES
Jammu and Kashmir	YES
Jharkhand	YES
Karnataka	YES
Kerala	YES
Madhya Pradesh	YES
Maharashtra	YES
Manipur	NO
Meghalaya	NO
Mizoram	NO
Nagaland	NO
Orissa	YES
Punjab	YES
Rajasthan	YES
Sikkim	NO
Tamil Nadu	YES
Tripura	NO
Uttar Pradesh	YES
Uttarakhand	NO
West Bengal	YES
Union Territories	NO
Andaman and Nicobar Islands	NO
Chandigarh	YES
Dadra and Nagar Haveli	NO
Daman and Diu	NO
Lakshadweep	NO
National Capital Territory of Delhi	YES
Puducherry	YES

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The ESPON 2013 Programme is part-financed by the European Regional Development Fund, the EU Member States and the Partner States Iceland, Liechtenstein, Norway and Switzerland. It shall support policy development in relation to the aim of territorial cohesion and a harmonious development of the European territory.

ISBN