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Territorial dimension of the Lisbon-Gothenburg strategy

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Executive Summary

In order to address the complex economic concept of **Competitiveness** (Lisbon), and the even more complex one of **sustainable development** (Gothenburg), the ESPON 3.3 project focuses on evaluating the coherence of the **territorial dimension of Lisbon and Gothenburg objectives** with respect to current and future challenges **in Structural Funds**.

The project studies the economics competitiveness as a system, as well as the territory and the environment, to calculate the **carrying capacity** of the economic/territorial/environmental systems at national (spatial systems) and regional scale (large areas) to be "**competitive in sustainability**". In the 3.3 project, this concept is to be distinguished from that of "sustainable competitiveness", commonly intended only in economic terms; identifying the territorial differences will mean providing the European regions and states with both cooperative possibilities on the basis of common carrying capacities and different chances to access the competitiveness arena (Structural Funds).

The **conceptual organisation** of the present project is focused on providing some tools and indications towards the policy solutions to some major issues that EU is asked to answer in a short time. Particularly, it is focused on how to reach a cooperative solution for the territorial use of the Structural Funds on the base of the **distinctive structural characteristics** that make a territorial area a subject in a global market.

Competitiveness in sustainability is able:

- to sustain the market competition through those endogenous factors that differentiate the EU territorial whole/systems (mix of social, environmental, economics indicators influencing the regional ranking within the enlarged Europe and in the international context);
- to face market competition with scenarios capable of guaranteeing environmental, social, cultural and economic sustainability;

- to have some management faculties (components) capable guaranteeing territorial competitiveness: awareness of its innovative capacity, organisation in networks, capacity to integrate the different sectors and levels of activities, to cooperate in and with other territories, to involve different public and private subjects and institutions, to have both a global, coherent vision respecting the use of local resources, to organise international, European, national, regional policies in a subsidiary vision.

The **methodological approach** is based on a qualitative-quantitative conceptual theory, also using the results of other ESPON projects, to calculate the **territorial capability**, i.e. the capacity of the territory to produce value and to own competitiveness/rank in sustainability at different levels.

The new point of view on territorial competitiveness in sustainability is based on a revision of the Porter's Diamond and its integration with new structural indicators (determinants) able to objectively put in comparison European Member States and their regions. The 3.3 project chose the following synthetic indicators:

- Innovation & Research
- Global/local interaction
- Quality
- Use of resources and funds

This project reconsiders the indicators' relationship in the vision of the Sustainable Territorial Management Approach – STeMA.

It implies continuous confrontation and updating to increase the levels of awareness and participation to the development choices.

It defines the "playground" for every determinant and contribute to determine the *status quo* and *vulnerability judgments*, to calculate the state and the risk of compromising the system/determinant with respect to the Structural Funds plan.

Status Quo is the state of the determinants (the critical elements to be competitive) and is defined by state indicators. ***Vulnerability*** is the description of the *effects* of the determinants and is defined by process indicators.

Urban-Rural Typologies (ESPON project 1.1.2) represent the link with the territorial dimension to construct a **composite final indicator** of territorial competitiveness in sustainability.

In our case, it becomes the **territorial capability**.

After having presented, in the first two chapters, the details on the approach and the methodology, as well as a review of the definitions of key concepts also found in previously released ESPON projects' reports, the SIR gives an example of statistical analysis of territorial competitiveness, by performing an exercise on the basis of 12 of the 14 "Spring report" structural indicators on the national level. The aim of this part of the work is to understand to what extent this reduced list of indicators may provide a territorial dimension to the Lisbon-Gothemburg strategy, as well as to establish a "reference point" to which the results of the new proposed methodology should be compared. Therefore, in the next phase, analysis will be extended, using, hopefully, the complete set of the social and environmental indicators mentioned above. Given the complexity of the new methodology and the issue of data gathering which is in progress, this chapter presents a first elaboration of the determinant "Innovation and Research", still at a national level. Depending on the results of data gathering (and consequent possible adjustment/variation of the indicators), the future analysis will be applied on the regional level (NUTS 3 and/ or NUTS 2). The territorial dimension is anyway introduced according to the above described matching with the Urban-Rural typologies.

The project presents **a selection of representative sample of regions** (case studies) for a more detailed study, supported on appropriate typologies of regions. The sample of regions allows us to test the efficiency of new synthesis indicators and their measurements in the respective source countries as well as to assess the spatial impacts of different sectorial policies relevant for the implementation of the Lisbon/Gothenburg Strategies. Beyond these objectives, this approach will permit to verify the application of the territorial development policy framework as formulated in the ESDP (especially the concepts of “polycentricism”, “urban-rural relations” and accessibility) and their contribution to spatial cohesion in Europe.

Finally, from each ESPON project, **recommendations, scenarios and the implications for competitiveness and sustainability have been considered**, where evident and appropriate.

The main work of the ESPON projects focuses on the comparative advantages of European regions, for instance in locating ‘hot spots’ and ‘cold spots’. Projects also focus on the economic performance of regions and the level of employment in a region, as well as where important development factors such as R&D, accessibility, ICT, nature and cultural assets are located. With regard to the fulfilment of the Lisbon objectives, this territorial perspective indicates that not all regions are potential ‘Lisbon areas’. Consequently, some regions need to develop their economic base around other assets as well. Innovation capacity is shown to be varying across the EU. Overall, the successful development of regions requires integrated packages of initiatives, and cooperation and coordination between sectors, policy areas at national and regional levels. In general though, enhancing European attractiveness would be supported if the European regions better exploited their diverse potentials.

The review above reflects the fact that previous ESPON projects have not considered sustainability and competitiveness concurrently, or their implications for each other. Indeed, some project conclusions infer that they are incompatible; however, the work in this project will attempt to unite the concepts through the development of the notion of competitiveness in sustainability and re-evaluate policy sectors in this context.

Policy recommendations will be developed in an integrated or cross-sectorial way and in their development we will continue to work closely with the other projects in the third ESPON strand, in particular project 3.2 (Scenarios).

In this scenario, the EU embarks on a mission to implement the Lisbon/Gothenburg strategy. While large enterprises and advanced regions will adapt to the new requirements based on (own and external) private resources, knowledge-based and innovative development of small and medium-sized firms and of more peripheral regions will need to be supported by EU and national policies. The EU and cohesion policy will play a more active role in these developments than previously. The most lagging regions are largely "written off" as having little promise for improving the EU's competitiveness.

It is assumed in this scenario that EU policy will build upon this process as a very important factor of European cohesion policy and, simultaneously, factor of European sustainable development and competitiveness. Additionally, this development process will largely contribute to a more polycentric structure of European space and urban network.

The policy approach toward individual member states or groups of member states will be differentiated to reflect the different potentials of member states.

A methodological comparison among the issues concerning the several ESPON projects/programmes in order to point out any disparity connected with **Policy Recommendations** is also presented, implying a preliminary look at what had already been proposed – in the form of "suggestions" – within the ESDP policy and, through this, also achieved.

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1. The central role of the territorial dimension in the "competitiveness in sustainability" framework

Competitiveness (Lisbon) is a complex concept. It's even more complex if we engage it with **sustainable development** (Gothenburg), because it means thinking both at the global scale (the scale of common ethical principles and policies) and the local scale (the scale of particular ethical programs and projects), looking at real territorial differences (single areas in different regions).
So, the traditional ideas/indicators of competitiveness and sustainability must be integrated: **i)** sharing them a new and common proposal, **ii)** tryining new measuring and interpretative models, and **iii)** being better linked to the territorial reality and its organisation and management.

*The pourpose of the project is to obtain the measure to be **competitiveness in sustainability** into the territorial dimension of national and regional levels, for orienting the future distribution of the Structural Funds.* Identifying the territorial differences will mean providing the European regions and states with both cooperative possibilities on the basis of common carrying capacities and different possibilities to access the competitiveness arena (Structural Funds).

Following the inputs from the document "Response on project 3.3 FIR" (by the Espon MC on 4.2.2005 and based on an informal discussion between the ESPON CU and the Lead Partner, plus input from DG Regio) and in addition to the 'Literature Review' included in the FIR (section 2), the TPG will make use of, as references:

- the Kok Final Report: **"Facing the Challenge. The Lisbon Strategy for growth and employment"** (November 2004);
- the study **Adaptation of Cohesion Policy to the Enlarged Europe and the Lisbon and Gothenburg Objectives** by the European Parliament's

Committee on regional development (provisional version, January, 2005) to assess the coherence of the proposed reforms (financial and social reforms) with regard to current and future challenges in Structural Funds and with the Lisbon and Gothenburg objectives;

- the **Communication from Mr. Almunia** (Brussels, 9.2.2005, SEC(2005) 161 final) to the Commission "**Sustainable Development Indicators to monitor the implementation of the EU Sustainable Development Strategy**" (Gothemburg Strategy). The list of indicators presented in annex is mainly based on the outcomeofdiscussions held among a group of experts known as the Sustainable Development Indicators Task Force. In fact, the Commission is currently preparing a review of the Strategy, which should be finalised in 2005. As indicators constitute a key tool for monitoring progress and evaluating the effectiveness of policies, some specific sustainable development indicators (SDI) will be useful in the review process[1].

Integrated the literature review presented in the FIR, some following scientific and innovative hypothesis are applied to the ESPON 3.3 project:

1) In order to obtain the Lisbon-Gothenburg objectives, it is necessary to work within a systemic vision (Von Bertanlaffy General Theory, 1969), pursuing its application into economic-territorial analysis and planning choices (Prezioso, 2003);

2) At the same time, both economy, territory and environment will be considered as a system. So such systems can be considered typical and representative characters of a region (according to the most recent international geographical literature) and in this vision they can be studied in order to provide a territorial vision of the application of the Lisbon-Gothenburg strategy;

3) The carrying capacity of the economic/territorial/environmental systems is the basis for regions (large areas) and states (spatial systems) to be

[1] This vision agrees in principle with the complex conceptual setting-out of the 3.3 project (see Tender).

"competitive in sustainability" (see DEFINTIONS). This concept is to be distinguished from that of "sustainable competitiveness" which is commonly intended only in economic terms;

4) The Strategic Environmental Assessment (SEA, Dir. CE/2001/42) is the logical common standard procedure to evaluate the territorial carrying capacity in a modern and comprehensive vision (the start-up to be competitive in sustainability);

5) The GIS is the best instrument to manage the complexity of the knowledge in a territorial system and the single processes that drive them and their carrying capacity (to be competitive within the sustainability threshold);

Further, the conceptual organisation of the present project is focused on providing some tools and indications towards the policy solutions to some major issues that EU is asked to answer in a short time:

i) how to reach a cooperative or competitive **internationalisation** of the territory (regional level – NUTs2). This is only one of the components influencing competitiveness and its role can be estimated only in comparison with that of other traditional competitiveness factors, because the basis of discussion is the firm's territorial organisation;

ii) how the **level of efficiency** of the public territorial government can play a major role for competitiveness in sustainability of territorial development planning; in fact, other than competition, efficiency can be considered directly correlated to the level of territorial ownership concentration

iii) how is it possible to obtain **symmetric information** of the territorial opportunities and development limits to design alternative development solutions for the territorial competitiveness in sustainability;

iv) how is it possible to manage the **territorial financial structure** of the regions and the market of access the source of funding (financial pressure and European Funds) on the basis of common and objective tools[2].

The 3.3 project will present the results in an appropriate format to support the policy-makers' decions.

Further, we present the fallowing **DEFINITIONS** to complete the project's references and the TPG common lexicom.

Sustainable development:

This is a concept defined by the Brundtland Report *Our common future* (1987), edited by the World Commission for Environment and Development (WCED), as *"...a development that satisfy the present needs* without compromising *the ability of future generations to meet their needs*" (see Almunia's Document, too).

Competitiveness in sustainability:

- To be able to sustain the market concurrence through those endogenous factors that differentiate the territorial whole/system (mix of social, environmental, economics indicators influencing the regional ranking within the enlarged Europe and in the international context).
- To have some cheap raw materials linked to entrepreneurial vital and innovative factors within a stable social context;

[2] At the present time, the comparison of cross-boundary performance is based on:

- o the quantity and the quality of goods and services to be sold
- o the territorial external economics (by urbanisation and agglomeration)
- o the distinctive structural characteristics (economic and institutional specialization, relations, organization of firms, infrastructure, etc.) that make a territorial area a subject in a global market;
- o the territorial presence of those communities that work like a system
- o a sustained increase in real incomes and in the standards of living of regions or nations, with jobs available for all those who wish to find employment (CEC, 2002: p.4). It is to be noticed that in the 2002 Communication concerning productivity, this concept of competitiveness is different from the narrower concept applying to the *competitiveness of enterprises*: domestic factors are less dominant determinants of the competitiveness of enterprises.
- o high and rising standards of living of a nation with the lowest possible level of involuntary unemployment, on a sustainable basis (CEC, 2003a: p6).

- To face market competition with scenarios capable of guaranteeing environmental, social, cultural and economic sustainability;
- To have some management faculties (components) capable guaranteeing territorial competitiveness: awareness of its innovative capacity, organisation in networks, capacity to integrate the different sectors and levels of activities, to cooperate in and with other territories, to involve different public and private subjects and institutions, to have both a global, coherent vision respecting the use of local resources and to organise international, European, national, regional policies in a subsidiary point of view.
- To have confidence in internal cooperation between different subjects and UE level for the environmental protection and development.

Economic competitiveness:

capacity to produce and to maintain in a territory with as much added value as possible, making the best use of the resources also through local cooperation.

Social competitiveness:

capacity of the subjects to intervene together (cooperatively cohesion) and effectively, basing on the agreements among the various institutional levels.

Environmental competitiveness:

capacity to show up the environment to advantage, as it is a "peculiarity" of the territory, guaranteeing at the same time the protection and renewal of natural resources and – in broad terms - of the natural heritage.

Positioning within the european and international context:

capacity of finding its own collocation (?) with respect to the other territories and the outside world, in the globalisation ranking.

Territorial capability: In the specific case, we want to build-up an indicator that might answer to the question if the given territory is able to generate/develop competitiveness, not in absolute terms but relatively to what Amartya Sen calls **"capabilities"** (Amartya Sen, 1999, *Development as Freedom*, New York: Random House). In our case, they become **territorial capabilities**, i.e capacity of the territory to produce value and to own competitiveness/rank at world level. This type of approach has two fundamental strength points:

- The initial resources' endowment plays a role such that a lesser handicap is imposed on those countries that have a lesser amount of them
- the concept of capability can be connected to the one of "use function" (that allows to estimate the realizations achieved and to carry out also a monitoring in time).

It's determined by eight parameters:

1. the attitude of the actors to develop and make the best out of the local competences and know-how, also through the proper use of new technologies;
2. the capacity of the actors to guarantee the best utilisation of the private or public financial resources available in a given territory;
3. the capacity of the actors to create enterprises, and to organize and manage them during time;
4. the capacity to access to those markets that provide economic surplus-value;
5. the availability of human resources and of corporate operators (human capital), as well as the capacity of interrelationship that occur among them;
6. the territorial cultural and identity dimension, measurable also by the liaisons stemming out from the sharing of some values among the actors in the territory;
7. the capacity to correctly manage public affairs: the relationships of interests, affinity or rejection; the structures devoted to the management of power; the ability to manage tensions and conflicts between subjects and the capacity to intervene in a way that is agreed

upon by the various public institutions and by the public and private sectors;

8. the potential provided by know-how and competences: the acquired knowledge about a social and democratic management, as well as the capacity to make the best of them and to acquire new ones.

The relationship between the competitive growth and the environmental development of economic systems is the aim of the analyses and measures to make concrete the paradigm of sustainability at various geographical scales.

This project proposes to reorganise the processes within the framework of the general sustainability (see the Almunia's Document), developing a vision of the relationship between economic activities and territory, through the integration of productive systems into the anthropic and natural ecosystems in which they operate.

The analysis integrates the microeconomic dimension, usually centred on the single firm and its productive processes, with the geographical-economic scales of reference and presents a simple model of the competitiveness in sustainabilty management that extends the territorial boundary of the "governance" beyond the portion of area directly interested in the activity of a group of economic activities, thus identifying the *wide area* of the *Sustainable Territorial Management Approach* – STeMA)[3].

In order to obtain the competitiveness in sustainability, it is necessary to perform, prior to evaluating competitiveness, an actual planning act, that is to say, to build a 'machine/process' that will be used to assess, in a territorial dimension, the present and future capability to become competitive.

This phase has been standardized below; it has been transformed into logical passages, so that it can be usefully traced at the state, regional, local scale.

[3] The STeMA requires a general reorganization of territorial activities to develop a management led by the paradigms and the philosophy of quality at all levels.

To make this procedure smoother, it is useful to list clearly some *caracthers* of the "competitiveness in sustainability" perspective that are proposed within this project's TPG.

- It is multidisciplinary and interdisciplinary, therefore it requires the aid of a number of disciplines and knowledge that is larger than that of traditional studies about competitiveness;
- It 'works' according to a systemic-qualitative and quantitative logic in a prospect of 'quality';
- It integrates competences, knowledge and languages by using the complex knowledge tools;
- It pursues the strict adherence to the objective of sustainability, to the 'bottom-up' development demand of the territory/environment, at the subsidiary scale of the Institution it refers to;
- It implies continuous confrontation and updating to increase the levels of awareness and participation to the development choices.

Being competitiveness in sustainability is, first of all, a voluntary and pro-active choice, the implications and responsibilities of which, from the political-administrative point of view, are evident (Lisbon and Gothenburg treaties).

1.1 Territorial dimension of competitiveness in ESPON projects

Competitiveness and its territorial dimension is addressed in one way or another in most ESPON projects. In some projects the issue of competitiveness was explicitly addressed in the Terms of Reference, other projects often refer to it in their reports or at least address issues relating to competitiveness. This comes as no surprise since the Lisbon Strategy and its Gothenburg update gradually became a central policy issue in the EU since their adoption in 2000 and 2001 respectively. "Balanced competitiveness" is also one of the three fundamental spatial policy goals that should contribute to the overarching goal of sustainable development according to the ESDP, which presents the formal basis of the ESPON program. But as stated in one of the ESPON projects *"it is important to recognize the inherently political nature of the balanced competitiveness concept and that it is open to varying interpretations at different geographical scales and in different parts of the EU."*

There are two basic approaches towards competitiveness that we can distinguish in ESPON projects. The first one is most closely connected with the origins of interest for competitiveness that we mentioned above. This one deals with the concept of competitiveness solely as a policy goal. In this view the main question is 'how to achieve competitiveness' of a certain territory. It implies that the concept itself is well defined and explained.

The second view is more interested in the nature of competitiveness and understanding the processes that generate competitiveness. In this view the main questions are 'what is competitiveness' and 'what makes one territory more competitive than another'. In this stage of our project this is the more relevant approach as it can contribute to understanding the phenomena of territorial competitiveness.

Therefore we focus on this approach and organize the excerpts from ESPON projects according to the determinants of the main conceptual tool used in this project, that is the modified Porter's Diamond (see FIR and the following chapter 2).

1.1.1 Innovation and Research

The aspects of competitiveness covered in the Innovation and Research determinant are subject of several ESPON projects, most evidently *1.2.2* and *2.1.2*. While the first one offers and overview of the telecommunication trends the second is dealing with many issues regarding R&D as well as innovation.

The final report of *ESPON project 1.2.2* emphasizes two aspects important for territorial aspect of competitiveness. The first one is the central role telecommunications have adopted in modern societies. *"We need only think of how, in a few short years, firms have come to depend on telecommunications networks within their competitiveness strategies."* As it has been often emphasized this development changes the perception of distance in the territory. *"Such developments offer enormous opportunities for reducing the 'friction of distance' and/or the problems of remoteness from which many peripheral regions and rural areas have suffered. At the same time, however, concerns are arising over the territorial dimension to the so-called 'digital divide', whereby any deficiencies in access to the advanced networks, or geographically-defined limitations in the capabilities of enterprises and households to make use of these networks, could serve to exacerbate, rather then ameliorate, territorial development disparities."* (p. 33-34).

The second important aspect addressed in *ESPON project 1.2.2* are the spatial impacts of the measures trying to stimulate competition on the telecommunications market. *"The key question from a regional perspective is how competition can be developed where there is little appetite amongst the telecommunications providers to address those markets. Measures adopted by national regulators to date seem to be 'spatially blind' in that they treat the country in question as a single entity and take no account of territorial differences when considering whether a measure designed to increase competitiveness is likely to be successful in inducing competition in peripheral regions…The proportion of customers to be covered in any given territory is usually drawn so that the least populous parts of the territory are not served, the provider's target figure being met through serving the more urbanised areas of the territory."* (p. 237-238)

The role of innovation is generally considered as the key element generating competitiveness. Spatial aspects of innovation and research are central issues of *ESPON project 2.1.2*, although they are less directly addressed also in some other projects (e.g. *1.3.2*). The final report of the project provides, among others, also some useful definitions. Regarding innovation, for instance, it says that there is no universal definition but that *"in the field of management, innovation is generally defined as 'an internally generated or externally purchased device, system, policy, process, product or service that is new to the adopting organisation' (Damanpour, 1991)."* (p. 35) Referring to this definition the project defines also the crucial question in innovation as *"how new devices, systems, policies, processes, products and services are identified and adopted by organisations."* This is why the subject of much research have recently been *"the processes through which knowledge, from a variety of sources, including R&D, is converted into innovations, which may in turn have impact on the productivity, growth rates and wealth in a given territory... models of innovation have become more sophisticated, moving away from the simplistic 'technology push' and 'market pull' models, towards a less linear and more interactive understanding of the innovation process."* (p. 36)

Contrary to the indicators for R&D, that are well established and include expenditure on and personnel employed in R&D activities, *"measuring innovation and the processes involved in the innovation system has proved more difficult."* (p. 36) Moreover, in innovation and knowledge transfer *"most critical aspects 'are not dependent upon frontier research, doctoral graduates, gross expenditures and so on, but on spillovers, linkages, networks, inter-dependencies, synergies etc' (de la Mothe and Pacquet, 1998). Developing this robust line of reasoning, other experts have argued that the 'technological and market knowledge which underpins innovation is often tacit and idiosyncratic, and therefore learned by doing, using and interacting with customers, suppliers and related industries' (Utterback and Afuah, 2000)."* (p. 38)

The definition of knowledge transfer that the report offers is *"the process by which knowledge, expertise and skilled people transfer between the science base and its user communities to contribute to the economic competitiveness, the effectiveness of public services and policy and the quality of life."* (p. 39) Again, there's a problem of measuring knowledge transfer. *"Although the most tangible forms of knowledge transfer are licensing and the establishment of start-up companies around intellectual property generated from R&D activity, these form a very small part of real benefits of knowledge transfer…This demonstrates the significant intangible element to knowledge transfer and the difficulty of assigning benefits to particular activities, either in space or in time."* (p.40)

Importance of networks is acknowledged in recent studies of innovation. *"One area where there does appear to be consensus is on the value of interorganisational networks. A range of studies in different contexts (Premkumar and Roberts 1999; Cooke and Willis 1999; OECD 2000) have confirmed the positive relationship between networking and innovation in so far as this increases the capacity available for innovation through additional resources, joint learning and knowledge flows."* (p. 42)

We arrive at the territorial aspect of innovation when the role of institutions in innovation is considered. *"It involves both institutions in terms of organizations, and institutions as norms, rules and behaviour. Crucially, institutions may thus be both the medium and the outcome of collective action (Morgan, forthcoming). The latter further reflects acceptance of the mutual compatibility of collaboration and competitiveness (Cooke, 1998) ... The acknowledgement of the role of actors (both collectively and individually conceived) beyond the firm and conventional R&D institutions coincides with conceptions of contemporary, associational, networked governance, as compared to the polar opposition of the market and the state (Grabher, 1993; Morgan, 1997, Morgan & Cooke, 1998).* (p. 43) The importance of institutional connectivity arises from this viewpoint. *"Institutions are thus actors, more intangible convergences, and regulatory mechanisms. Such co-ordination permits both knowledge flows and synergies – in particular, the re-combination of knowledge to produce new orders of innovation, and in order to adapt it to enable assimilation."* (p. 46) From the territorial perspective *"the spatial agglomeration of different institutions, including different industrial functions thus becomes important beyond the traditional* *conceptions of external economies in terms of 'collective economies' which require extra-market, co-ordinated and active involvement of actors, a certain amount of solidarity."* (p. 47) Referring to the issue of *"which parts of the system need to be localised, some authors have in fact suggested that non-local links are an important dimension to learning and a means of overcoming local limitations."* (p. 49) As a rule of thumb the report concludes that regarding territorial aspect of innovation *"the greater the complexity, uncertainty and tacitness of an activity, the more it will require physical as opposed to virtual proximity to be transacted. (Morgan 2004)"* (p. 49)

1.1.2. Global/local interaction

Concepts important for this determinant are dealt with in several of the ESPON projects. This is the most overarching determinant and in general it describes the interaction of the territory with its wider context.

The role of telecommunications is again of great importance when the interaction of certain territory with its context is considered. The spatial aspects considered in *ESPON project 1.2.2* and described in previous determinant hold true also regarding global/local interaction. These are the potential of telecommunications to reduce the 'friction of distance' as well as the danger of the 'digital divide' which both imply that better access to the services of the 'virtual society' enhances the ability of a territory to interact with its wider context. On the other hand the 'spatial blindness' of measures adopted by national regulators intended to increase competitiveness are emphasized, which take no account of territorial differences.

Another crucial issue determining the ability of a territory to interact with a global context is its physical accessibility and its position in transportation networks. Although often accessibility is considered to be of major importance for a competitive position of certain territory and its economic performance the results of *ESPON project 2.1.1* presented in its final report do not totally support this popular view. *"The main general result from the* *scenario simulations is that the overall effects of transport infrastructure investments and other transport policies are small compared with those of socio-economic and technical macro trends, such as globalization, increasing competition between cities and regions, ageing of the population, shifting labor force participation and increases in labor productivity."* (p. 13) Despite this conclusion regarding transport policies, the project later does assume a more general importance of interactions through transport and telecommunication infrastructure for the European economy. *"Efficient and effective communications are essential for the competitiveness of European industry and commerce, the cohesion of the European economy and the welfare of Europe's citizens. Despite this pivotal role, policy towards transport and communications has often been developed without sufficient regard for its impact on these wider aspects."* (p. 40)

One of the aspects the report mentions is also the importance of transport operators for the competitiveness of a region or a nation. *"For national policy competitiveness has been seen more as preserving the competitiveness of national transport operators than using transport as a means of enhancing either national or EU competitiveness of industry as a whole. Thus we find individual member states seeking to ensure that ports, airports, rail operators and, above all, airlines and road haulage companies can compete effectively in the European markets."* (p. 251)

In connection of transport policy with other policies the role of research and development is emphasized again. *"On the one hand, research and development is seen as a means of overcoming some of the negative problems of environmental impacts, on the other hand research is an essential means of ensuring the competitiveness of domestic transport vehicle producers (road and rail) in the integrating European market, and more especially in third country markets."* (p. 252)

The project also emphasizes the inherent conflict present in European spatial policy goals on several occasions. *"One cannot expect one single design of transportation policy to be optimized for contributing to competitiveness,* *efficiency and growth of the entire EU area, for environmental sustainability, social equity and a balanced spatial development at the same time"* (p. 257) It also points to the origin of these conflicting goals. *"These conflicts arise because the way in which transport itself interacts with other sectors and the way in which transport policies, both infrastructure policies and pricing/regulation policies are poorly understood – or at least open to different interpretations. Thus transport as an agent of economic growth conflicts with transport as a destination of public funds. Transport as an agent of enhancing competitiveness conflicts with transport as an agent of improving accessibility and cohesion. Transport as a source of welfare through mobility conflicts with the need to control harmful effects on the environment."* (p. 253)

When interaction of certain territory with its wider context is considered we have to at least briefly take note of the concept of polycentricism. Although it is primarily related to policy approach it is of course based on some assumptions that are important for understanding global/local interaction as well. In *ESPON project 1.1.1* dealing with the issue of polycentricism the relational aspect is emphasized as one of two main defining elements (beside the morphological one). The relations among urban areas are defined as connections through flows (structural relations) and cooperation (institutional relations) on different scales. Regarding the issue of scale the project makes a distinction between connections over large distances and connections based on proximity. *"Distant urban areas may be connected through various types of relations such as market-based flows or exchanges, or cooperation directed towards the sharing of experiences, methods, or information, or by participating in a development project, etc. These relations are characterized by connectivity rather than proximity."* (p. 47) Therefore for large distances institutional relations are the prevailing type. On the contrary in proximity, structural relations are more common. *"Spatial proximity between urban areas potentially allows for other forms of cooperation and integration to take place: economies of scale through* *shared infrastructure, such as universities and hospitals, or common strategies to manage flows and exchanges generated by commuters, telephone calls, etc. The most frequently used indicator for economic integration is travel-to-work intensity between cities. A situation with intense commuter flows in both directions would be a sign of integration and of polycentricism."* (p. 48)

1.1.3 Quality

The determinant of quality is the one that is generally most difficult to describe. It is a multi-dimensional concept including different distinguishable qualities of a territory. Among them are quality of life, quality of the environment and quality of the institutions and governance in a certain territory. Each of these is a complex concept on its own and addressed in several of the ESPON projects, although none of them has been investigated thoroughly.

Despite the distinct concepts and different ways of measuring them, it is also important to emphasize their interconnectedness and the ways in which they complement each other contributing to competitiveness of a certain territory. A nice summary of this is offered again in the *ESPON project 1.1.1* in relation to polycentricity. *"As a general rule, large city regions have a wider set of economic activities than do smaller regions, especially as regards services. They also have larger labour markets. Therefore, they offer better services for businesses and families as well as more job opportunities. On the other hand, large city regions also face a number of challenges in respect of welfare issues, such as traffic congestion and crime. A city region's physical structure may be important for pollution levels and for the availability of recreation areas. The challenge is therefore to combine the advantages of size without having too many of the disadvantages.*" (p. 228)

A very similar explanation from a different point of view is offered also in the final report of *ESPON project 2.2.3* dealing with the effects of structural funds on urban areas. *"The size of a city is also seen by some authors as a factor of competitiveness, with larger cities viewed as being more* *competitive. The shrinking of distance with the advent of High Speed Trains, for example, is argued to be contributing to the decline of small and medium-sized cities which are excluded from the new network. However, the better quality of life which smaller towns and cities may offer may act as a counter-weight to this process."* (p. 11)

Although the project is focused on urban areas it offers also some overall picture of competitiveness that contributes to the quality issue. It emphasizes, for example, the social aspect of quality and its connection with economic one when it states that a good mix of both aspects is crucial for the success of the cities. *"For example a successful city offers a sufficient density and mix of employment options, good quality education, leisure and childcare facilities to be able to cater for lifestyles, culture, jobs and the needs of dual-career families (such as diversity of opportunity)."* (p. 11)

The importance of economic performance on quality has never been in question. In fact, until recently GDP as an indicator of economic performance has often been used also to describe both competitiveness as well as quality of life. In relation to economic performance functional or economic specialization is often mentioned as a key component contributing to competitiveness of a certain territory. *ESPON project 2.2.3* offers an example of this issue. *"Trollhättan and Lahti provide two examples of a strategy to support further specialisation in response to increasing international competition. In Lahti the focus is especially on the plastic and metal industry, and on environmental technology. This is in line with the establishment of "Centres of Expertise" in Finland, with a high degree of regional specialisation."* (p. 68) Despite a wide consensus that such "economies of scope" contribute to competitiveness of a territory the difficult part is again how to measure this. The project warns against connecting it directly to economic structure. *"Whilst economic structure is clearly an important determinant of the economic performance of a city the nature of the industrial base does vary ...Care is also needed not to associate economic structure too closely with competitiveness. Competitive cities can* *successfully sustain thriving industries in declining sectors whilst expanding sectors may grow sub-optimally in non-competitive cities."* (p. 11)

Another important aspect of quality is also the quality of institutions and governance. Partly this aspect was addressed already in the innovation and research part when discussing the role of institutions in innovation. Again also the *ESPON project 2.2.3* raises some issues. *"Important questions are being raised about the role and nature of governance in the promotion of territorial development. Its tasks are seen as ranging from maintaining 'competitiveness' to developing innovative milieux and managing development within environmental capacity limits. Major change is towards wider partnership, across sectoral and administrative borders, including private and voluntary sectors. The significance of networking, which is recognised as being crucial for entrepreneurs, is also increasing amongst localities."* (p. 12) The *ESPON project 2.3.2* dealing specifically with the issue of governance is of course also adding some important aspects to this in its first interim report. In the overview of documents on governance it cites *Third Report on Economic and Social Cohesion* on several occasions. *"'There is a growing consensus about the importance for regional competitiveness of good governance – in the sense of efficient institutions, productive relationships between the various actors involved in the development process and positive attitudes towards business and enterprise. Nevertheless, regions still differ markedly in these respects and in their ability to develop their own competitive advantage given the expertise they possess'...' it is widely accepted that good governance and an effective institutional structure are an important source of regional competitiveness through facilitating cooperation between the various parties involved in both the public and private sectors ...they can improve collective processes of learning and the creation, transfer and diffusion of knowledge and transfer ... they can cement networks and public-private partnerships and so stimulate successful regional clusters as well as regional innovation strategies and policies.'"* (p. 46)

1.1.4 Use of resources and funds

The fourth and last determinant is trying to describe to what extent the available resources, directly or indirectly included in previous determinants, are used efficiently in a certain territory. Use of economic resources, human resources or natural resources can be considered separately in this determinant. In fact, there is little reference to any of these aspects found in ESPON projects.

In terms of economic resources *ESPON project 2.2.1* about the spatial effects of structural funds could offer some insight. One of the conclusions is that, of course, the spending is closely connected with the designation of eligible areas. When describing the map on structural funds spending it states that it *"clearly reflects the dominance of Objective 1 areas and presents the general core-periphery image of Europe."* (p. 8). Besides this expected conclusion a more important one is that *"the potential contribution of the Structural Funds to achieving ... spatial policy aims will depend on the geographical level in question."* (p. 9) So at different scale levels the effects of structural funds differ. Following are the detailed explanations for different scale levels but there is little or no direct reference to the issue of competitiveness in this respect. On the other hand there is also no overview of the national spending and its spatial effects offered so far in ESPON projects.

Similar observations can be made also in terms of the efficient use of human resources. Employment and productivity as some of the main categories in this regard are not addressed in ESPON projects directly so far. There are only partial overviews included in *ESPON project 2.1.2* regarding the employment in R&D sector in relation to the innovation and research.

There is some reference to the use of natural resources available though in the third interim report of *ESPON project 2.1.4*, that deals with the spatial effects of energy policies. Although in the first place it warns that *"in fact there is surprisingly little evidence and research of the effects of energy* *development (increased quality and quantity of supply) on economic development."* (p. 8) One of the most important points stressed is that *"energy has a strong potential to become an important factor of life cost and of quality of life and a determinant of residential and urban location choices. Namely, energy can be a decisive factor of mobility choices and impact strongly in urban form and in the use of urban space. Fuel prices may have an important impact on modal split between car and public transport. In what concerns transport, there is an evident relationship between physical planning and energy consumption."* (p. 9) Efficient use of energy in terms of mobility therefore becomes an important aspect of territorial development. In terms of the relation between efficient use of energy and economic performance *"it seems there is an inverse relation between development and the intensity of economic uses of energy (industry and transport energy consumption divided by GDP ppp). Higher levels of development mean a higher proportion of services and higher energy efficiency."* (p. 15) We have therefore again come upon a familiar chicken-and-egg problem that is so common when competitiveness is considered.

1.2 The territorial dimension

The 2003 Competitiveness Report focuses on the *regional aspects* of competitiveness in terms of:

- productivity (regional GDP per hours worked), work-leisure balance (total hours worked per employee),
- the rate of employment and demographic factors (the ratio of the population of working age)

In order to empirically analyse regional competitiveness, both across regions and across time, although data availability limit the number of indicators and the depth of analysis, sufficient indicators were available to measure productivity in 15 sectors across the NUTS-2 regions between 1980 and 2000. Similarly, proxies were identified to measure the importance of knowledge in the regional economy. This analysis suggested a positive correlation of productivity with research and development intensity, specialisation in high-tech activities and the number of students in tertiary education (CEC, 2003a: p. 11).

But as the EU is characterised by substantial regional diversity in wealth, and competitiveness conditions differ substantially across regions, this conceptualisation and these factors are not sufficient to explain the problem and to find a solution.

Regional development is strongly linked to national and regional competitiveness. According to the *Third Report on Economic and Social Cohesion*, regional development requires favourable national conditions such as a macro-economic environment conducive to growth, employment and stability and a tax and regulatory system which encourages business and job creation (European Commission, 2004).

Two complementary sets of conditions at the regional level also need to be satisfied:

- physical and human capital or infrastructure (material infrastructure in the form of transport, telecommunications and energy networks, and water supplies, for example, and human capital in the form of a labour force with appropriate levels of skills and training).
- innovation, information and communication technologies (ICT), and environmental protection. This set of conditions largely relates to 'intangible' factors that are also related to business competitiveness (the capacity of a regional economy to generate, diffuse and utilise knowledge and maintain an effective regional innovation system; a business culture that encourages entrepreneurship; and the existence of cooperation networks and clusters of particular activities).

There is, therefore, neither a unique nor fixed recipe for successful regional development. Regions must find the right policy mix for their own development path according to their particular economic, social, cultural and institutional features. The importance of good governance for regional competitiveness is also recognised elsewhere in the document (European Commission, 2004: p. 58).

Reviewing policy literature and assessment reports concerning the Lisbon Strategy helps in identifying key themes associated with competitiveness. The three European Council documents produced in 2003 and 2004 entitled 'Lisbon Strategy Conclusions (Lisbon to Thessaloniki) by theme', 'Lisbon Strategy Conclusions (Lisbon to Brussels) by theme' and 'Kok Report' provide an important source of material to identify key themes associated with competitiveness. These reports review the progress towards the goals of the Lisbon Strategy according to the various themes developed from the structure of the original Lisbon conclusions of 2000 (European Commission, 2003a and b). These main themes include:

- establishing a European area of research and innovation
- economic reforms for a complete and fully operational internal market
- more and better jobs for Europe
- the social policy agenda
- a strategy for sustainable development
- putting decisions into practice: a more coherent and systematic approach

'The Lisbon Scorecard IV' (Murray, 2004) is a further useful source of material. This report is also based upon similar main headings as the two European Council documents produced in 2003 (see above), with the exception of the theme of policy implementation or governance, to which the Centre for Economic Reform's Report pays less attention.[4] The five main headings of the Centre for Economic Reform's report are:

1. innovation
2. liberalization
3. enterprise

[4] 'putting decisions into practice' is the heading used in the two European Council documents to refer to the theme of policy implementation or governance

4. employment and social exclusion
5. sustainable development

The regional and national territory is not treated as undifferentiated space of the social and economic action but as a physical space to receive and check the territorial capability of competitiveness therein. The results of the ESPON project 3.1 have already shown the territory as real expression of the R&D's, innovation and education demand and supply, with regard to production and employment market. Therefore, the territory becomes a parameter to measure virtuous solutions supporting the regional entrepreneurial structure in terms both of environmental sustainability and of improvement of cohesion and integration levels between different territorial actors (institutional and not institutional).

In this framework, the work described in this Interim Report work analysed:

- the role of the territorial context in the international competition at national and regional level;
- the factors (as quality, governance, ICT, human capital, efficient use of resources) determining an improvement in the territorial performance and competitiveness at different geographical scales (states, regions, cities, metropolitan areas).

A wide variety of forces can contribute to improve the attractiveness and competitiveness degree of a territory in relation to Lisbon/Gothenburg strategy. The main concepts are:

- continuous qualitative improvement
- cultural and social heritage valorisation
- sustainable use of resources (natural, economic, human)
- preventive assessment of policies, programs and projects

In such a reference context, the research of new structural indicators able to put objectively in comparison European Member States from a territorial competitiveness viewpoint, requires a revision of the **Porter's Diamond** (Fig. 1). The diamond's model needs to be updated according to the recent indications from new economics and social models for a new EU respecting Lisbon 2000 and Gothenburg 2001 strategy. In this way it's possible to insert a further star in Porter's diamond, crossing the first, which increase interaction elements to be considered. In adding to the classics elements of Porter's diamond:

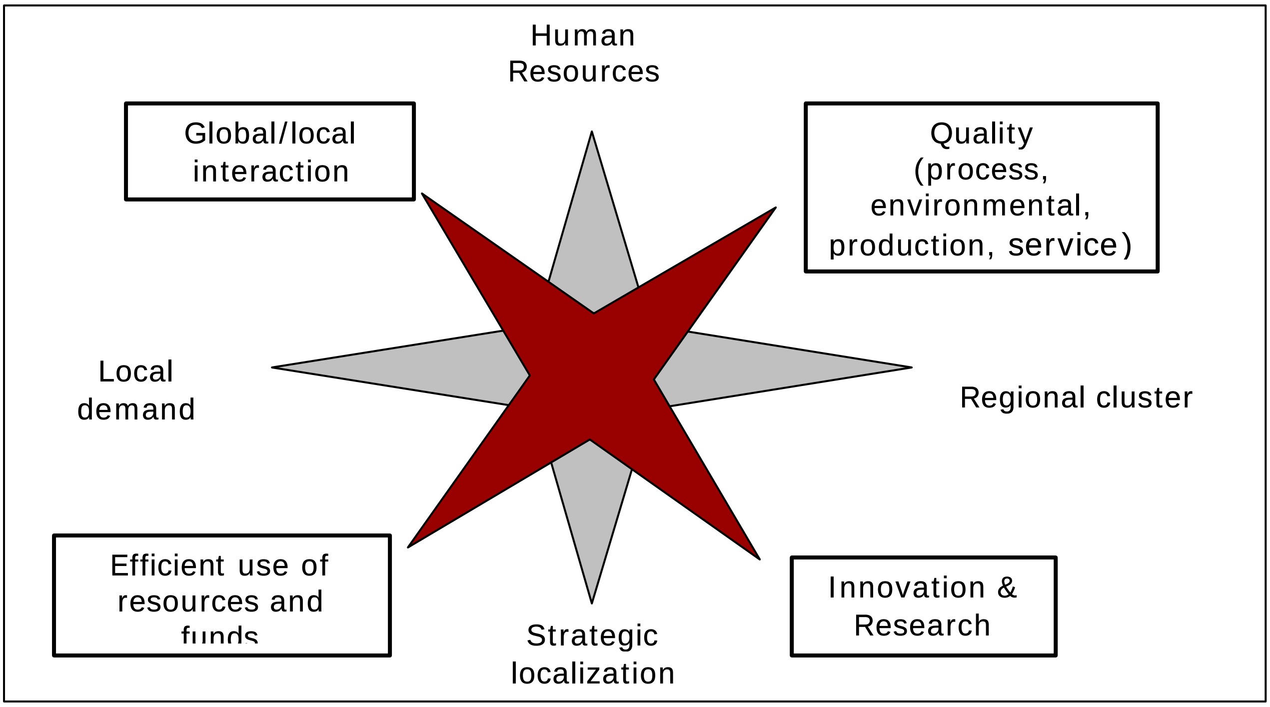
- Strategic localization
- Local demand
- Integration with regional *cluster*
- Human Resource

We can list four additional categories of elements that will include the classic elements, too:

- Global/local integration
- Quality (process, environmental, production, service ones)
- Innovation Technology
- Efficient use of resources and funds

The new scheme deriving from the concepts above is the following:

Fig.1 – The Modified Porter's Diamond



The detailed description of the four determinants can be found in the First Interim Report (pp. 41-ff.).

2. Analysis and indicators

2.1 The process that precedes the Structural Funds choices as based on the "competitiveness in sustainability" paradigm'

In order to compare the national and regional background that allows the redaction of the new Structural Funds' Plan (SFP), it's necessary to build the conceptual scenario of competitiveness in sustainability.

It is to be conceived according to the European directives and through the definition of the determinants, based on the criteria and parameters to be assigned in order to calculate their functionality towards the objectives of this project.

To plan a territorial capability of competitiveness in sustainability, it is first of all necessary to complete the following steps:

- fix and share a common lexicon (common language)
- define the 'quality plan' applied to the plan's procedures and process
- define the modalities of acquisition of certified data
- arrange the general architecture to apply the systemic method
- arrange the systemic architecture of the Capability Framework, the Programmatic Framework (the present framework of EU institutional laws, norms, directives and instruments), the Project Framework (modality of granting of the new Structural Funds) and the modalities of relation
- arrange the contents and cognitive procedure to express the *ex ante* judgement, by applying the systemic-qualitative and quantitative method to every determinant of the Capability Framework and to their interrelation
- arrange the contents and the procedure to apply the systemic-qualitative and quantitative method to every component of the Programmatic Framework

- arrange the contents and the procedure to apply the systemic-qualitative and quantitative method to every component of the Project Framework and to their interrelation
- design the architecture of the information and management system
- design the SEA and insert it in the architecture of the information and management system
- define the contents of the territorial governance

Every determinant outlines, at the scale of pertinence to the SFP, *the logical tree*[5] of the information and the judgements that will have to be produced to respond to the logic of the system. This means identifying the process and the target through which the basic elements of every determinant interact individually or on the whole.

The determinant expresses judgements by sending 'messages' that reverberate on the state of its elements and on the domain of their relations.

This, in turn, permits to have a readout of the determinant, in terms of the minimum mapping unit expressed by the geographical scale of the phenomenon (in this case the administrative sub-regional boundaries) that is defined by the extent and the organisation of their relationship (in this case the national/transnational/european level).

Single areas or elements of small and medium area contribute to express the *status quo judgement*[6], i.e. their 'state of health' compared to the limit within which use is consented without compromising their precise characteristics of definition with respect to the analyzed system. In our approach, the function or level of status quo are defined by a set of

[5] The logical tree presented in the FIR is actualy in revision, because it is linked at some check.

[6] This concept corresponds to "state indicators" in the well-known DPSIR Environmental Assessment Framework (EEA and OECD).

indicators[7] that concur in the definition of the determinant, as described in the "logical tree".

The wider (macro-area) territorial domain of interaction (or inter-relation) defines the "playground" for every competitiveness component or determinant and contribute to determine the *vulnerability judgment*, or risk of compromising the system/determinant with respect to the Structural Funds plan.

Within such domain, the interactions between the *critical* elements may occur in synergy or in reciprocal prevalence; this builds up an intrinsic risk of compromising (*vulnerability)*, that allows to asses the potential impact that could come from the realization of the plan or part of it.

In short: in our treatment *vulnerability* is intended as the capacity of containing or not a competitiveness capability exercised from the exterior into a macro-system of which the *a priori* responses are unknown, while *status quo* is meant as the values and responses suggested by the behaviour of individual indicators (micro vision).

This method of reading the territorial competitiveness is, in our opinion, the most adequate one, for several reasons: the system of definitions used, the area concerned, the objective pursued (the competitiveness in sustainability in relation to the Structural Funds).

Therefore, in the definition of the macro-areas it is particularly important to identify the parameters that define both their contents and their limitations. Consequently, it will be possible to accredit the characters that distinguish the macro-area with sufficient certainty.

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[7] Into the Almunia's Document (2005: 2-6), the indicators (a preliminary set of Sustainable Development Indicators – SDI consisting of 12 headline, 45 core policy and 98 analytical indicators) reflect the various priorities adopted in Gothenburg (climate change, public health, management of natural resources, transport, ageing society, social exclusion and poverty) and subsequently in Barcelona in 2002 (global partnership for sustainable development), as well as the commitments which the EU made at the Johannesburg summit on sustainable development, again in 2002 (patterns of production and consumption, good governance).
Some examples of the indicators which can be found on the Eurostat website are shown below: http://europa.eu.int/comm/eurostat/sustainabledevelopment

For the *ex ante* definition of the Capability Framework, it is necessary to combine the status quo and the vulnerability (added in a non-algebraic way) to express *the overall sensitivity judgment* in the domains of the determinant.

After the end of this phase, it is possible to start the one of building the scenarios of Structural Funds granting, according to the indications provided by the Capability Framework.

In this approach, that faces the challenge of adding the "territorial dimension" to peculiarly economical-political aims (competitiveness and sustainability), the main operational problem is that the majority of indicators describe social-economical phenomena that are not completely "territorialised" because of the statistical relevance of the data themselves, both in terms of modality of the survey and of geographical level of detail.

In this particular case, the great majority of the data needed to build from the indicators up to the determinants, are at present available mainly at national (NUTS0) and, less frequently, at regional (NUTS2) level.

From our point of view, the most appropriate territorial level on which the analysis of the competitive process should be addressed is, instead, the "provincial" one, i.e. NUTS3. In fact, the readout of the programmatic demand –to which the SF policy should provide a consistent offer- is best performed at this intermediate level of subsidiarity.

This problem may be solved by taking advantage of the work made by those ESPON projects which have provided territorial typologies of various kind, namely, the most part of the thematic projects of priority 1. Most of them, or at least the ones that are more closely related to our framework, have in fact been geographically referred to the NUTs3 administrative level (see tab. 9 of 3.2 project's SIR).

The territorial typology may help providing a way to "project" onto a more detailed reference, data that are generally assigned to a much wider boundary. On the other hand, this allows to retain a source of information that is geographically more detailed, even when this has to be combined with less detailed ones.

The theoretical bases on which our approach is founded guarantee, as will also be demonstrated by specific analyses, the significance of this sort of projection, that has also been used in previous ESPON-related studies[8] and that is also included in the studies under ESPON Project 2.4.2 “Zoom in”.

Moreover, this point of view is also consistent with the application of the vertical subsidiarity principle within the European States/regions.

Among the typologies produced by the ESPON thematic projects, the choice that appeared to be the most suitable to our approach was that of Urban-Rural Typologies, that are congruent to the NUTS2 scale.

The final classification in six typologies was chosen, which is here reported.

Tab. 1 - **Urban-Rural Typologies**

Rank	Typology	Basic units
A	1 High urban influence, high human intervention	NUTs 3
B	2. High urban influence, medium human intervention	NUTs 3
C	3. High urban influence, low human intervention	NUTs 3
D	4. Low urban influence, high human intervention	NUTs 3
E	5. Low urban influence, medium human intervention	NUTs 3
F	6. Low urban influence, low human intervention	NUTs 3

Source: ESPON project 1.1.2

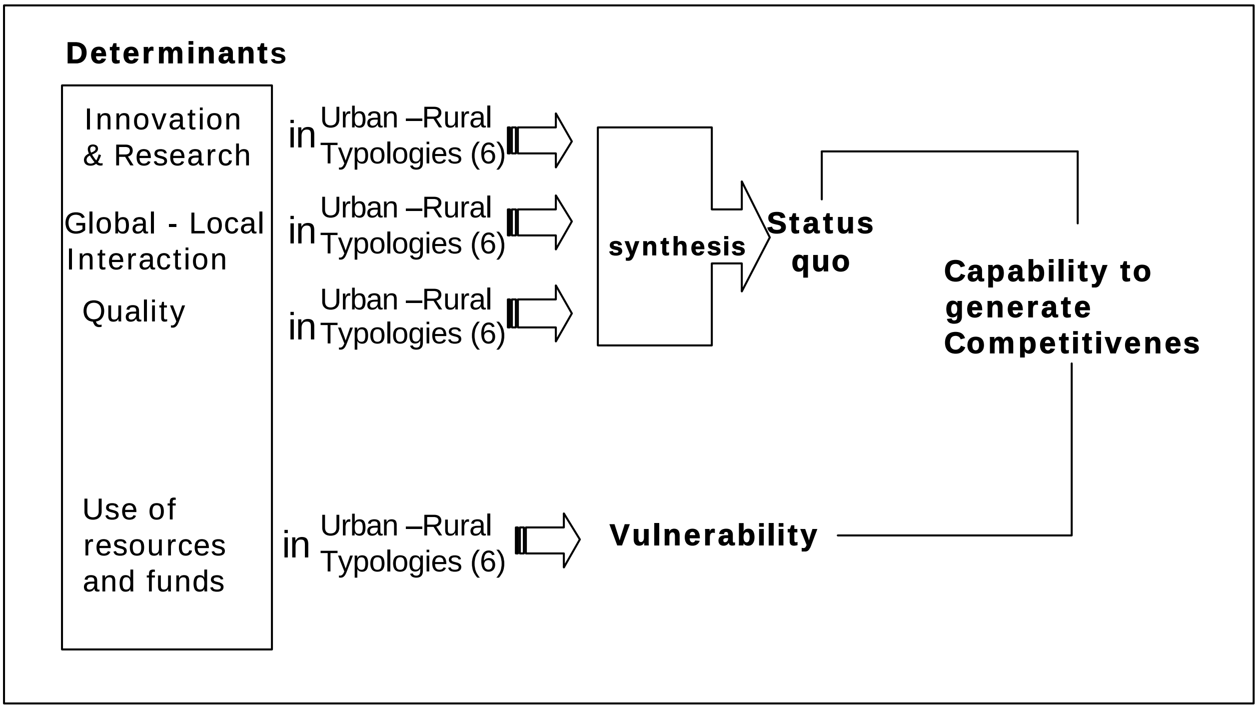
The above differentiation will be used as a way to weigh the determinants' final values. The process of determinants' weighting is performed according

[8] See, *e.g.*, SPESP 1999, Final Report of the working group on Cultural Heritage.

to the already mentioned systemic approach; basically, we have maintained the order in the table as provided by the original project, to reflect the ranking of the typologies in our conceptual approach, in an operational way that is still under development and that will be presented in the Third IR

Through the connection of the determinants to the territorial typologies – that come, in turn, from a specific weighting process - it will be possible to specify the Territorial Capability to be Competitive in Sustainability (Fig. 2).

Fig. 2 - The connection of the determinants to the territorial typologies



The particular final result of sensitivity of an area should not be considered in absolute terms, but rather relative to the SFP. Therefore, for the definition of the sensitive areas it is necessary to refer also to the SF granting scenario, because the detection of a of particular *"problem area"* is not necessarily restricted to the presence of highly critical levels of some determinants in that area.

The choice of the indicators for each determinant is driven by environmental/territorial, technical, social and economic criteria. The first ones reflect physical/natural aspects; the other parameters, instead, depend on the type of plan that must be carried out. In general, they are conditioned by the objectives and the design standards that the plan requires.

The *Structural Funds plan's actions* are identified, quantified and related with the phases of economic-financial and managerial assessment that make them feasible.

The recognition of the effects potentially generated by the plan's actions is a core issue. The value of the impact is in fact produced by the effects of the designed plan's actions; it is then to be assessed as the difference (correlation matrix) between the degree of risk to overtake the carrying capacity threshold and the improvement in performance and competitiveness generated by the actions scheduled in the SF plan, given a starting state of capability described by the determinants[9].

2.2 The operational definition of the determinants and the indicators

In order to measure the territorial capability of the competitiveness in sustainability for each UE territory we have to distinguish between *status quo* and *vulnerability* that are the necessary aspects to evaluate

Status Quo is the state of the determinants (the critical elements to be competitive) and is defined by state indicators. Looking only to this value, its optimality is an infinite growth.

[9] Therefore, we can say that it is a The approach that seems the more appropriate one is therefore an **approach** of **territorial-multidimensional** type that revolves around three key objectives/principles:

- sustainability
- cohesion
- integration

that on one hand, constitute the foundations for the activities of the various actors who interact on a given territory and on the other hand, define their inter-relations with the other territorial dimensions.

Vulnerability is the description of the *effects* of the determinants and is defined by process indicators. This value allows us to define a sustainability threshold that should not be trespassed.

Following this approach, the concept of territorial competitiveness is decomposed in **four determining factors** or **determinants** (see the modified Porter's Diamond, Fig. 1) that can be further decomposed in **typologies, sectors and categories**. The latter ones are finally "explained" by basic **indicators** (see Table 2). It is obvious that while determinants, typologies and sectors are composite elements, categories are, instead, synthetic, *i.e.* they are explained by indicators that are homogenous regarding the considered phenomenon.

This territorial approach places some questions that become operational steps.

i. How to normalize the measurement in order to compare the different indicators?

Due to the different sources of the indicators involved, they have to be normalized, so that their value will range between 0 and 1.

Normalization procedures are mathematical transformations of quantities (more generally, vectors). In the normalization, the input vector I is converted into a normalized output vector I^N. That is to say, each element I_j of the input vector is converted into an element I_j^N of the output vector

$$I_j^N = f(I_j) \qquad I_j \in \mathbf{I}$$

f stands for the normalization function.

This function can be implemented in various ways, depending on what type of value domain the transformed vector should occupy and what types of statistical properties it should exhibit. *This experimental verification's phase of the methodology applied the vectorial normalization*.

This normalization procedure ensures that all elements of an input vector are transformed proportionally into an output vector of this type

$$I_j^N = \frac{I_j}{\sqrt{\sum_{j=1}^{m} I_j^2}}$$

Where:

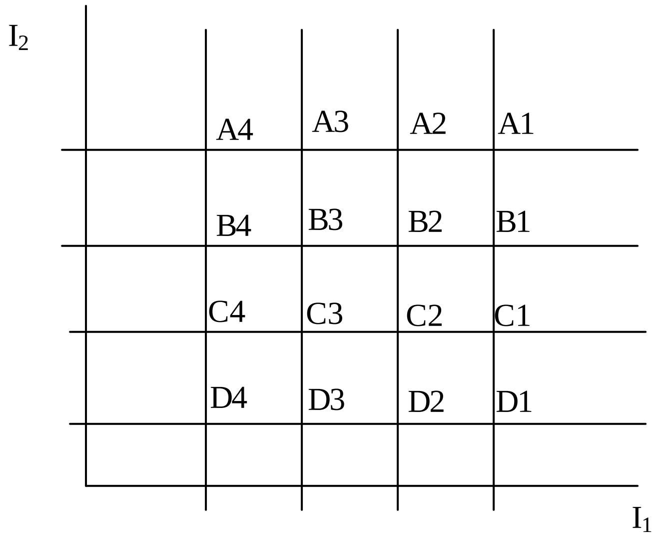
I_j it's the value assumed from the indicator in the territory j-th

At the present phase of the methodology, this normalizing the single indicators is on the beginning of the process[10].

ii. How to put in relations the various determinants, categories and indicators once normalized?

In this case the methodology follows **two different techniques**. The first is *the construction of qualitative interaction matrices* that, on the base of credited scientific theories or of reasonable demonstrations (in this respect, a fundamental support is represented by the case studies), given the value of the single indicator, returns the qualitative value of the corresponding synthetic/composite indicator.

[10] To make easy the reading, we have omitted the sub-index *j* in the last result of the determinants's formula (see Annex).



with

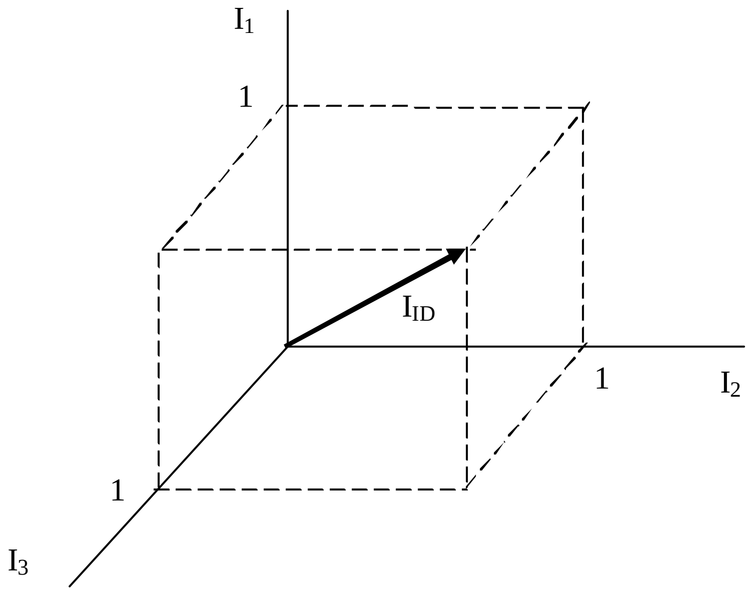
A1>A2>…….>B1>B2>…..>D4

The second, known as the "ideal vector", is borrowed from a statistical investigation method applied in several fields[11], including marketing and ecology. The point is to define a multidimensional vector describing an optimal situation after defining which optimal value each component could have. Of course, due to the normalization the indicators (the components) will range between 0 and 1.

In the case showed in Fig. 3, we have a phenomenon characterized by three components I_1, I_2, I_3 (but generally we can have *n* vector components). All the three components give a positive contribute to the final indicator $I_{F;}$ so, in the optimal configuration (I_{iD}), they have to be at their maximum value that is 1 (in the case of negative contribution the optimal configuration is the minimum value that is 0)

[11] This concept is involved, inter alia, into a study by Z. HELLWIG (1968).

Fig. 3 – Example of optimal configuration



Now we can construct the actual values of the vectors for each territory (I) and calculate the distance (D) between them and the ideal one (I_{ID}). This distance becomes the value of the (final) synthetic indicator I_F.

$$I_F = |D| = \sqrt{(1+I_1)^2 + (1+I_2)^2 + (1+I_3)^2}$$

The situation is illustrated by the following picture (Fig. 4); All the more small is the distance, all the better is the performance of the given territory (NUTS). The direction of the "distance vector" may provide further information as it depends on the performance described by each component.

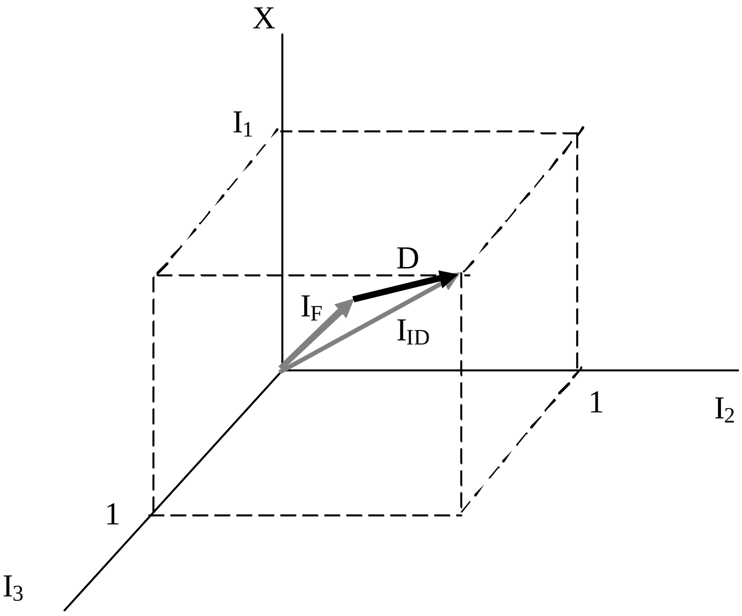


Fig. 4 – The final Indicator I_F

iii. How to control the future evolution of national and regional competitiveness with respect to this conceptual approach

At this phase of the project, we suggest to ESPON MC to think at a possible "mid-term" assessment of the Structural Funds (2007-2013).

We are checking some different measures to answer at this question, to be applied to the indicators in order to evaluate their variation in a period of time.

iv. How to (territorially) contextualize the measurement in order to compare the different territories?

This problem can be solved after having obtained determinants values linking them to the regional typologies (the 6 urban-rural typologies of ESPON 1.1.2) and building qualitative relations matrices to have a weighed value.

This type of approach allows one to construct an indicator which includes not only the information on the current situation according to its own specificities, but also on the real dynamics of the actions that enable a given goal to be reached: in this case we turn from the simple **territorial competitiveness** to the **ability to generate territorial competitiveness in sustainability**.

The procedure to define the indicators and the correlation matrices are shown and described in the Annexe.

The grid of indicators, categories, sectors, typologies and determinants and the relationships between them (synergy tree) are shown in Table 2.

In Table 2 it has also been provided indicating the possibility of finding data already gathered by several ongoing or finished ESPON projects.

ESPON
EUROPEAN SPATIAL PLANNING OBSERVATION NETWORK

	Determinants	Typologies	Sectors	Categories	Indicators
STATUS QUO	Innovation & Research	Knowledge and Information Society	"virtual" society	Population	n° internet users, population with tertiary education, n° pop. e-learning
				Institutions	n° municipalities with e-government, ICT expenditure, GDP pro capita
				Firms	n° firms with internet access, n° firms wiht own web-site, n° firms e-commerce
			Knowledge creation facilities (cfr. ESPON 2.1.2 thematic maps)	R&D	public R&D expenditures and business R&D expenditures as a percentage of GDP per capita
				R&D infrastructures	Science Parks that are members of the International Association of Science Parks (ISAP), n° Business Innovation Centres, Most Actively Publishing Universities and Public Research Institutes
		Technological equipment (cfr. Espon 1.1.2 thematic maps)	Old technologies		n° fixed lines/households, n° mobile/pop, n° housholds with TV
			New technologies		n° PCs/pop, n° broadband subscribers/pop, n° internet servers/sup
		Human Resources	Human capital (structure)		dependency index, youth index
			Innovative Human capital (education)		population with tertiary education, population in life-long learning, public expenditure for education, science and technology graduates, early school leavers
	global local interaction	International cooperation	general environment concerns		SEA, EIA, EMAS, Århus Convention, Espoo Convention

	on environment	atmosphere		Kyoto Protocoll, Aircraft Engine Emissions, LRTAP, UNFCCC, Protection of the Ozone Layer
		hazardous substances		CRTD, Basel Convention, Convention on the Transboundary Effects of Industrial Accidents, ADN, Rotterdam Convention, Stockholm Convention on POPs
		Marine Environment		London Convention 1972, MARPOL 73/78, Bunkers Convention, 1969 CLC, AFS Convention, 1992 Fund Convention, HNS Convention, OPRC, Intervention Convention, LOS Convention
		Marine Living Resources		CCAMLR, ICCAT, ICRW, SPAW, IAC, IOSEA, AIDCP
		Nature Conservation and Terrestrial Living Resources		The Antarctic Treaty, World Heritage Convention, Convention on Biological Diversity (CBD), Bern Convention, CMS, CITES, Ramsar Convention, ICAM Protocoll, CCD, FAO International Undertaking on Plant Genetic Resources, ITPGRFA, ITTA1994
		Nuclear Safety		Assistance Convention, Notification Convention, Convention on Nuclear Safety, Vienna Convention on Civil Liability for Nuclear Damage
		Freshwater Resources		ECE Water Convention
	Social interaction	Phisical	**Migration (cfr. ESPON project Demography)**	

			Tourism	Inbound (International Tourist Arrivals ITA, International Tourist Receipts ITR); Outbound (International Tourist Arrivals, International Tourist Expenditures); Accomodation capacity
			Cultural exchange	n° student (erasmus, socrates, leonardo,…)/tot student; researchers movements/tot researchers
		Virtual interaction	Population	n° internet users, population with tertiary education, n° pop. e-learning
			Institutions	n° municipalities with e-government, ICT expenditure, GDP pro capita
			Firms	n° firms with internet access, n° firms with own web-site, n° firms e-commerce
	Economic	productive system identity		districts, local productive systems, big firms, product trademarks, territorial trademarks, typical events (n°, expenditure, affluence),
		Energy (cfr ESPON …. Thematic maps)	production	
			consumption	
		internazionalization		foreign percentage market, FDI, foreign productive units, export/import at regional level
		Strategic localization	**natural hazard (cfr. ESPON ……thematic maps)**	
			accessibility	**Phisical (cfr ESPON project 1.2.1 and 2.1.1)**
				Virtual=technological equipment (cfr ESPON project 1.1.2)
			costs	fuel price, **energy price (cfr. ESPON**

				Project), fiscal pressure
			Knowledge creation facilities (cfr. ESPON 2.1.2 thematic maps)	R&D (public R&D expenditures and business R&D expenditures as a percentage of GDP per capita)
				R&D infrastructures (Science Parks that are members of the International Association of Science Parks (ISAP), n° Business Innovation Centres, Most Actively Publishing Universities and Public Research Institutes)
			Human capital (education)	population with tertiary education, population in life-long learning, public expenditure for education, science and technology graduates, early school leavers
Quality (process, environmental, production, service)	Life quality	economic variables		GDP per capita (PPS) or the difference of the GDP per capita (PPS) from the average of the EU, consumption per capita, consumer-price index, level of unemployment (unemployed/active population), level of poverty (population beneath the poverty line/total population)
		social variables	Human Capital	Human capital (structure)
				Human capital (education)
			criminality	criminality index
			Demography (cfr ESPON project)	population density, hope of life, fertility rate, dependency index rate
			equal opportunities	n° active population/total n° active population, n° of diplomaeds high school/ total n° of high school diplomaeds, n° of graduates/total n° of

				graduates
		environmental quality	Quality of natural element and level of noise	air, water, and soil, noise index
			public and private institution responsability	ISO, EMAS, SEA, EIA GPP
			land use (cfr.ESPON ….thematic maps)	green area per capita, protected green area per capita, artificial surface per capita, less favourite areas per capita, agricolture area per capita
			natural hazard (cfr. ESPON ……thematic maps)	earthquake, flood events, forest fires, volcano risk
		infrastructural variables	welfare	n° of hospital beds, n° of policy offices, n° of post offices
			leisure	cultural opportunities (n° of theatres, n° of cinemas), sport facilities, n° of hotels beds
			phisical accessibility (cfr. ESPON 1,21 and 2.1.1thematic maps)	roads, railways, airports, harbours

			technological equipment (cfr. Espon 1.1.2 thematic maps)	tv, broadband, mobile, digital tv, telephony
	Environmental quality	**Energy consumption (cfr ESPON …. Thematic maps)**	consumption of energy from not renewable resources	KW produced by arbon, oil, gas ,
			consumption of energy from renewable resources	KW produced by renewable resources
			consumption of energy from nuclear	KW produced by nuclear
		Waste	Municipal Waste	production of solid waste
			Hazardous Waste	production of solid waste
			Nuclear Waste	Radioactive waste generated by uranium mining and milling, fuel enrichment, decontamination and decommissioning
			Recycling	
		land use (cfr.ESPON ….thematic maps)		green area per capita, protected green area per capita, artificial surface per capita, less favourite areas per capita, agricolture area per capita
	Local Governme	participation		voters (% of voting rights population), access to administrations web-site, •

		nt quality (cfr ESPON governance project)			citizen Involvement rate in local government
			welfare		n° of hospital beds, n° of policy offices, n° of post offices
			Use of economic resources		number of financing projects, distributed funds, % of co-financing
VULNERABILITY	Use of resources and funds	Economic resources	**Use of structural funds (cfr. Espon project)**		n° of financing projects, distributed funds, % of co-financing (with national and european funds)
			World Economic Forum Competitiveness index		
		Human resources	**HDI (Human development Index)**		
			human capital (employment)		unemployment long-term rate, vacancies, employment rate, employment in medium-high and high-tech manufacturing, employment in high-tech services, employment in R&D, employees with tertiary level education working in a science and technology occupation (HRSTC)
			productivity		labour productivity (per worker and per hours), cost growth per labour unity, average age of retirement
			Cohesion	**Cohesion Index (cfr ESPON zoom project)**	
		Natural resources	safeguard		biodiversity index, world heritage list, world heritage sites
			consumption		energy intensity of economy

			production		pollution (air, water, soil), waste
			Sustainability	**ESI - Environmental Sustainability Index 2005**	
		Resource for the innovation	**SII - Summary Innovation Index cfr. EIS 2004**	Human resources	S&E graduates / 20-29 years, Population with tertiary education, Participation in lifelong learning, Employment in med/high-tech manufacturing, Employment in high-tech services,
				Knowledge creation	Public R&D / GDP, Business R&D / GDP, High-tech EPO patents / population, High-tech USPTO patents / population, EPO patents / population, USPTO patents / population,
				Transmission and diffusion of knowledge	SMEs innovating in-house, SMEs involved in innovation co-operation, Innovation expenditures / turnover, SMEs being non-technical innovators,
				Innovation finance, output and markets	High-tech venture capital share, Early stage venture capital / GDP, Sales 'new to market' products / turnover, Sales 'new to firm' products / turnover, Composite indicator on Internet access, ICT expenditures / GDP, High-tech manufacturing value-added share

Tab. 2 – Grid of indicators, categories, sectors, typologies and determinants and the relationships between them (synergy tree)

3. The four determinants in the EU countries

As already pointed out several times throughout this project, the current vision of regional competitiveness has been defined as the ability of a region to anticipate and successfully adapt to internal and external economic and social challenges, by providing new economic opportunities, including higher quality jobs for its citizens (European Commission 2003: 6). The question goes: how to identify these kinds of abilities statistically? According to the methodology presented earlier in this report, the answers relate to the chosen indicators as well as to the interpretation of determinants, which express the status quo as well as capabilities and vulnerability of particular regions.

3.1 Interpretation of competitiveness in the EU countries

This chapter gives an example of statistical analysis of territorial competitiveness, by performing an exercise on the basis of 12 of the 14 "Spring report" structural indicators on the national level. The aim of this part of the work is to understand to what extent this reduced list of indicators may provide a territorial dimension to the Lisbon-Gothemburg strategy, as well as to establish a "reference point" to which the results of the new proposed methodology should be compared. Therefore, in the next phase, analysis will be extended, with the other social and environmental indicators mentioned in the previous chapter. Given the complexity of the new methodology and the issue of data gathering which is in progress, in the **Appendix 0** a first elaboration of the determinant "Innovation and Research", still at a national level, will be included. Depending on the results of data gathering (and consequent possible adjustment/variation of the indicators), the future analysis will be applied on the regional level (NUTS 2, see Table 3). The territorial dimension is anyway going to be introduced according to the above described matching with the Urban-Rural typologies.

3.1.1 The competitiveness of member states according to structural indicators

Commission of the European Communities presented in 2003 (*COM(2003)585final*) a list of 14 structural indicators in order to make it easier to present Member States' positions relative to the key targets of the Lisbon strategy. The list is labelled a "shortlist" due to the fact that it is chosen from a more extensive list of 42 structural indicators. The reasons given for the shortlist is that it makes it easier to present a clear picture of the Member States' positions relative to the most important Lisbon targets. The indicators are supposed to be easy to understand and logical in structure as well.

Available at the moment are all indicators except the one on financial market integration (convergence in bank lending rates) and on regional employment rates. The list of 12 structural indicators provides the statistical basis for the presentation of competitiveness in this chapter. Each indicator is considered on NUTS0-level (national level) relative to the EU25 average (corresponding to value 100). Countries included are EU25 as well as a number of accession countries, other European countries, and, as points of reference, Canada, the USA and Japan.[12]

Each territorial unit is ranked according to the list of indicators, and the results are presented in a series of 12 maps. Number of classes applied per criterion is 5: the medium class consists always of 5 countries and the upper two as well as the lower two classes an equal or close to amount of countries (5-7 countries per class). In addition, the indicators are grouped in three blocks, that is, environmental indicators (12, 13, 14), social indicators (9,

[12] Territorial units included are Austria (AT), Belgium (BE), Bulgaria (BG), Canada (CA), Switzerland (CH), Cyprus (CY), Czech Republic (CZ), Germany (GE), Denmark (DK), Estonia (EE), Spain (ES), EU15, EU 25, Finland (FI), France (FR), Greece (GR), Croatia (HR), Hungary (HU), Ireland (IE), Iceland (IS), Italy (IT), Japan (JP), Lithuania (LT), Luxembourg (LU), Latvia (LV), Malta (MT), Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Romania (RO), Sweden (SE), Slovenia (SI), Slovakia (SK), Turkey (TR), United Kingdom (UK), United States (US).

10) and economic indicators (1, 2, 3, 4, 5, 6, 7). All the territorial units under consideration are ranked according to the sum of values in each block, and the results are presented in three maps. The overall ranking of the considered territorial units is defined according to the sum of social and economic indicators, multiplied with the sum of environmental indicators. A final ranking could be made in a variety of way, and some of the possibilities were actually tested. Despite the way the equation for calculating the final ranking is constructed, there seems to be a strong correspondence between the outcomes of the different equations.

The chosen indicators are:

Tab. 3 – Traditional structural indicators and Country coverage

Indicators	**Country coverage**
1. GDP per capita	Full coverage
2. Labour productivity	Full coverage
3. Employment rate	Full coverage
4. Employment rate of older workers	Full coverage
5. Spending on human resources (public expenditure on education)	15 MS + 12 ACC
6. Research and Development expenditure	15 MS + 12 ACC
7. Information Technology expenditure	15 MS + 11 ACC
8. Financial market integration (convergence in bank lending rates)	***Not applicable (measured by the variation across***

	available countries)
9. At risk-of-poverty rate	Full coverage
10. Long-term unemployment	Full coverage
11. Dispersion of regional employment rates	12 MS + 6 ACC ***Not applied***
12. Greenhouse gases emissions	Full coverage
13. Energy intensity of the economy	Full coverage
14. Volume of transport	15 MS + 11 ACC

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The list of indicators is balanced to reflect the importance that Lisbon and Gothenburg placed on the domains of employment, innovation and research, economic reform, social cohesion and the environment. The following paragraphs explain the reasoning behind the choice of each indicator for the shortlist.

- **GDP per capita** is the most common measure of the standard of living. If the EU is *"to become the most competitive and dynamic knowledge-based economy in the world"*, the gap in GDP per capita with our main competitors needs to be eliminated. A high level of GDP per capita is also important to provide the resources to promote social cohesion and to protect the environment. It is therefore important that we understand the underlying causes of our GDP growth performance and whether it is sustainable. Other indicators in the list cover the most important factors driving GDP growth.
- **Labour productivity** per person is a main indicator of EU competitiveness. Output can be raised through more labour input or more output per unit of labour input (labour productivity), which is

driven by capital and technology. Raising labour productivity is particularly important for sustaining growth during a period of ageing populations.

- The **employment rate** is a summary measure of the use of labour in the economy. There is considerable scope for the EU to raise its employment rate and hence to raise output and living standards. Lisbon set a target of raising the EU's employment rate to 70 per cent by 2010, which reflected the broader goal of achieving "*growth with more ... jobs*". Moreover, employment promotes social cohesion, which was clearly recognised in the Lisbon European Council conclusions: *"the best safeguard against social exclusion is a job"* (§32).
- The **employment rate of older workers** is particularly low in the EU. Raising the employment rate of older workers is essential in order to achieve a higher overall employment rate (hence raising output and living standards). It also increases social cohesion through a better integration of older workers in the labour force and helps ensure the sustainability of economic growth by tackling the problems resulting from ageing populations. Lisbon set a target of raising the EU's employment rate of older workers to 50 per cent by 2010.
- **Spending on human resources**, here defined as public expenditure on education, measures the amount of resources devoted to improving human capital. If the resources are used efficiently, spending on human resources increases the productivity of workers contributing to higher living standards. In addition, spending on human resources is important for social cohesion by ensuring that everyone has access to the education and training they need to participate in an increasingly knowledge-based society.
- **Research and development spending** is essential for making the transition to a knowledge-based economy as well as for improving production technologies and raising growth. Recognising the benefits

of R&D for growth and aware of the rapidly widening gap between Europe's R&D effort and that of our principal partners in the world, the Barcelona European Council set the EU a target of increasing R&D expenditure to 3 per cent of GDP by 2010, two thirds of which should come from the private sector.

- **IT expenditure** is included in the shortlist to reflect the importance of IT for productivity growth in the knowledge-based economy. Research is continuing into the explanations for the differences in productivity growth since the mid-1990s between the EU and the US and among the EU's Member States. However, there is a consensus emerging that the United States' superior productivity performance has to a large extent been driven by IT-producing and IT-using industries. This finding supports the emphasis the Lisbon European Council put on making the EU "the most competitive and dynamic knowledge-based economy in the world" by 2010.
- **Financial market integration** is a key part of the Lisbon agenda of economic reform. An integrated financial market facilitates access to finance and reduces its cost. Market integration of financial service markets should bring about a **convergence in bank lending rates**. This indicator will be significantly improved by the entry into force of Regulation ECB/2001/18 that will allow the European Central Bank to collect harmonised time series across countries. ***At the moment this indicator is not applicable.***
- The **at-risk-of-poverty rate**, which is defined as the share of the population below a defined poverty line according to equivalent disposable income, measures the risks of poverty and social exclusion. This indicator is in accordance with the Lisbon European Council's high priority on social cohesion.
- Reducing **long-term unemployment** is important for achieving the Lisbon goal of *"greater social cohesion"*, because the long-term

unemployed face a high risk of social exclusion. The long-term unemployment rate also reflects structural problems in the labour market, which lead to an under-utilisation of human resources. In addition, reducing long-term unemployment is important from a human capital perspective, because the long-term unemployed become detached from the labour market and lose their skills.

- Increasing regional cohesion by reducing regional disparities as measured by the **dispersion of regional employment rates** has long been an aim of EU policy. Ensuring all regions enjoy high levels of employment is important both for raising employment and output across the economy and for improving social cohesion. ***At the moment this indicator is not applicable.***
- A degradation of the natural environment has negative effects on the sustainability of economic growth. In addition, it may have a direct negative effect on welfare. Climate change may cause significant disruption to economic activity with consequent social effects, and may also threaten environmental resources such as biodiversity. The indicator **greenhouse gases emissions** measures whether the EU's growth is sustainable in terms of its potential impact on climate change. The EU has clear targets for reducing greenhouse gases emissions.
- The **energy intensity of the economy** measures the decoupling of energy use from GDP growth and shows the extent to which energy is being used more efficiently in the creation of wealth. Energy use from non-renewable resources can have a damaging effect on the environment and on the sustainability of economic growth, therefore it is important to use energy resources efficiently.
- The **volume of transport to GDP ratio** measures the decoupling of freight transport growth from real GDP growth. Rising volumes of traffic can damage the environment and economic growth through

rising levels of congestion, noise and pollution. The full internalisation of the social and environmental costs of transport should promote a significant decoupling of transport growth and GDP growth.

The results of the ranking of the territorial units under consideration according to the12 indicators are shown in a series of 12 maps (see appendix 1: Ranking according to indicators, Maps 1-12).

3.1.2 Three dimensions of competitiveness

The indicators are grouped into three blocks: (1) environmental indicators, (2) social indicators and (3) economic indicators. Indicators that are not included are number 8 (financial market integration) and number 11 (dispersion of regional unemployment rates). The ranking according to the sum of indicator values of each block is presented in a series of maps (see appendix 2: Ranking according to sum of indicators /environmental, social, economical/, Maps 13-15). The various indicators are not weighted in any way in this exercise, and the independence of indicators in relation to each other is not confirmed. Consequently, the results are only indicative in a very sketchy way and should not form the basis for any far-reaching conclusions.

Environmental ranking

The environmental ranking includes three indicators, i.e. *greenhouse gas emissions*, *energy intensity of the economy* as well as the *volume of transport* (the relative values of which are simply added and divided by number of indicators) in order to have a simple ranking among territorial units under consideration. It is noteworthy to underline that gas emissions concern percentage *change* since base year (1995-2002) according to the Kyoto Protocol/EU Council Decision for 2008-2012. Energy intensity of the economy is calculated on basis of *change* during the period 1995-2002 according to gross inland consumption of energy divided by GDP (at constant prices, 1995=100) –kgoe (kilogram of oil equivalent) per 1000 Euro. Volume of freight transport relative to GDP is calculated on basis of *change* during the period 1995-2002, and includes transport by road, rail and inland waterways. The index of inland freight transport volume is relative to GDP, measured by transported weight per km per GDP (1995=100).

Among European countries, Bulgaria scores best, followed by Denmark, Slovakia, Latvia and Germany. In the second best group are found Lithuania, the UK, Austria, France and Luxembourg. See map 13.

Social ranking

The social ranking includes 2 indicators, that is, at *risk-of-poverty rate* (in 2002) and *long-term unemployment* (in 2002). The risk-of-poverty rate indicates the share of persons with an equalized disposable income below the risk-of-poverty threshold, which is set at 60 percent of the national median equalized disposable income. The long-term unemployment rate (12 months or more) indicates a percentage of the total active population.

This ranking indicates the social exclusion at its most severe state. On the next phase analysis will be extended with more sophisticated indicators of social cohesion such as income level, standard of living, housing conditions and for example the existence of family relations.

The leading countries are the Netherlands, Luxemburg, Denmark, Sweden, Cyprus and Austria, followed by the UK, Ireland, Finland, Portugal, Hungary, Czech Republic, Slovenia and Germany in the upper two classes. See map 14.

Economic ranking

The economic indicators encompass *GDP per capita PPS* (in 2002), *labour productivity* (in 2002: GDP in PPS per person employed relative to EU25=100), *total employment rate* (2002: employed persons aged 15-64 as a share of the total population of the same age group), *employment rate of older workers* (2002: employed persons aged 55-64 as a share of the total population of the same age group), *spending on human resources* (2002: public expenditure on education as a percentage of GDP), *research and development expenditure* (2002: gross domestic expenditure on R&D /GERD/ as percentage of GDP) and *information technology expenditure* (2002: annual data on expenditure for IT hardware, equipment, software and other services as a percentage of GDP).

According to the economic ranking, Sweden is in the top followed by Denmark, Finland and Luxemburg. The second highest category encompasses the Netherlands, France and the UK. See map 15.

3.1.3 Overall ranking of competitiveness

The three blocks of environmental, social and economic indicators were considered in combination by adding the blocks of social and economic indicator values and multiplying them with the sum of environmental values. This kind of exercise could be carried out in a number of ways (see table 5).

In the overall ranking, Denmark, Sweden, Luxemburg and the Netherlands are in the uppermost category, followed by Norway, the UK, Austria, Germany and Finland. The Southern and Eastern Europe did not do very well in average. In Eastern Europe, Latvia and Bulgaria score comparatively well due to environmental factors. See map 16.

By introducing other ways of weighting the various indicators, the overall picture may change. See table 4.

Table 4 - Country ranking of the environmental, social and economic indicators

Environment *		**Social ****		**Economy ****		**Environment x (Soc**
Portugal	76	Bulgaria	64	Bulgaria	52	Greece
Spain	77	Poland	65	Turkey	54	Romania
Greece	77	Lithuania	71	Romania	54	Poland
Cyprus	80	Greece	76	Poland	65	Spain
Czech Republic	83	Italy	76	Cyprus	65	Estonia
Slovenia	87	Estonia	81	Slovakia	67	Portugal
Finland	90	Latvia	81	Latvia	70	Lithuania
Ireland	91	Spain	89	Lithuania	71	Slovenia
Hungary	93	Romania	93	Greece	74	Czech Republic
Estonia	93	**EU 25**	100	Hungary	75	Italy
Belgium	96	Malta	109	Estonia	81	Cyprus
Italy	98	EU 15	113	Slovenia	83	Hungary
Poland	99	Belgium	113	Spain	83	Latvia
Sweden	100	France	115	Czech Republic	85	Bulgaria
EU 25	100	Germany	116	Italy	87	**EU 25**
Netherlands	100	Slovenia	126	Portugal	87	Belgium
EU 15	100	Czech Republic	146	Ireland	99	EU 15
Romania	101	Hungary	149	**EU 25**	100	Ireland
Luxembourg	102	Portugal	152	EU 15	104	France
France	103	Finland	153	Austria	105	Finland
Austria	104	Ireland	186	Germany	105	Germany
United Kingdom	107	United Kingdom	221	Belgium	107	Austria
Lithuania	110	Austria	240	France	110	United Kingdom
Germany	112	Sweden	278	Netherlands	110	Netherlands
Latvia	119	Denmark	292	United Kingdom	113	Luxembourg
Slovakia	120	Luxembourg	306	Luxembourg	121	Sweden
Japan	121	Netherlands	347	Finland	125	Denmark
Denmark	127			Denmark	130	

Bulgaria	174	Sweden	146

* Data is missing from Turkey, United States, Malta, Norway, Iceland

** Data is missing Turkey, United States, Norway, Iceland, Slovakia, Japan, Cyprus

*** Data is missing Turkey, United States, Malta, Norway, Iceland, Slovakia, Japan

Table 5 - Indices according to different calculation method

Avarage value of indices: sum (1-13) / 13

En(S+Ec)_A_Index: (12+13+14) * ((9+10) + (1+2+3+4+5+6+7))

En(S+Ec)_B_Index: (12*13*14) * ((9+10) + (1+2+3+4+5+6+7))

En(S(Ec))_A_Index: (12+13+14) * (9+10) * (1+2+3+4+5+6+7)

En(S(Ec))_B_index: (12*13*14) * (9*10) * (1*2*3*4*5*6*7)

En^3(S^2(Ec))_A_Index: $(12+13+14)^3$ * $(9+10)^2$ * (1+2+3+4+5+6+7)

En^3(S^2(Ec))_B_Index: $(12*13*14)^3$ * $(9*10)^2$ * (1*2*3*4*5*6*7)

Avarage value of indices		En(Ec+S)_A		En(Ec+S)_B		En(S(Ec))_A		En(S(Ec))_B		En^3(S^2(Ec))_A		En^3(S^2(Ec))_B	
RO	73	GR	58	EE	17	BG	0	PL	42	RO	0	GR	20
PL	73	RO	64	RO	20	RO	0	GR	44	BG	0	PL	26
GR	75	PL	64	LT	23	PL	1	RO	51	LT	0	ES	30
LT	80	ES	65	CZ	28	LT	1	LT	55	EE	0	EE	42
ES	83	EE	75	GR	34	LV	1	ES	57	PL	0	LT	47
EE	84	PT	77	PL	36	EE	2	BG	58	LV	0	IT	48
LV	84	LT	78	ES	37	GR	2	EE	60	GR	0	RO	48
BG	84	SI	81	BG	40	ES	8	IT	65	ES	1	LV	77
IT	88	CZ	81	LV	41	HU	12	LV	67	CZ	2	SI	88
SI	91	IT	83	PT	44	CZ	15	SI	91	PT	6	PT	89
HU	92	HU	85	HU	48	IT	17	EU25	100	HU	8	EU25	100
CZ	94	LV	86	SI	57	SI	23	PT	101	IT	9	CZ	102
PT	95	BG	95	IT	79	PT	19	CZ	102	SI	13	BG	110
EU25	100	EU25	100	IE	80	IE	99	HU	103	IE	97	BE	122
EU15	105	BE	104	FI	91	EU25	100	BE	116	EU25	100	HU	133
BE	105	EU15	107	BE	95	BE	159	EU15	118	BE	159	EU15	135
DE	109	IE	108	EU25	100	EU15	167	FR	130	EU15	214	FR	158
FR	109	FR	114	EU15	107	DE	249	DE	137	FR	391	DE	198
IE	112	FI	117	FR	120	FR	258	IE	168	DE	616	FI	209
FI	121	DE	121	AT	136	AT	578	FI	171	FI	772	IE	258
AT	127	AT	14	DE	14	FI	685	AT	260	AT	2620	AT	671

			0		9								
UK	130	UK	147	NL	163	UK	869	UK	270	UK	4080	UK	687
LU	147	NL	163	UK	168	NL	1473	LU	378	LU	10149	SE	1127
NL	147	LU	166	LU	172	LU	1475	NL	384	NL	11184	LU	1211
DK	156	SE	175	SE	173	DK	6873	SE	406	SE	46274	NL	1337
SE	157	DK	210	DK	306	SE	7335	DK	480	DK	151953	DK	2248

Environmental data is missing from Turkey, United States, Malta, Norway, Iceland,
Social data is missing Turkey, United States, Norway, Iceland, Slovakia, Japan, Cyprus
Economic data is missing Turkey, United States, Malta, Norway, Iceland, Slovakia, Japan

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European Commission (2003). Competitiveness, sustainable development and cohesion in Europe – From Lisbon to Gothenburg. Structural policies and European territories. European Commission Directorate-General for Regional Policy, Brussels.

See: **Appendix 1** **-** Ranking according to indicators

See: **Appendix 2** - Ranking according to sum of indicators /environmental, social, economical

4. Case studies' choice: the methodology

4.1 Justification of objectives and a preliminary methodological note

The main objective of this chapter is to present a selection of representative sample of regions for a more detailed study, supported on appropriate typologies of regions. The sample of regions allow us to test the efficiency of new synthesis indicators and their measurements in the respective source countries as well as to assess the spatial impacts of different sectorial policies relevant for the implementation of the Lisbon/Gothenburg Strategies. Beyond these objectives, this approach will permit to verify the application of the territorial development policy framework as formulated in the ESDP (especially the concepts of "polycentricism", "urban-rural relations" and accessibility) and their contribution to spatial cohesion in Europe.

In order to respond to the above mentioned objectives, both assessing the territorial dimension of the Lisbon/Gothenburg Strategies and identifying the extent to which the policy framework defined in the ESDP has been integrated, choosing the sample region should obey to a series of relevant criteria, as the following:

i) to secure the 'representability' and geographic diversity of the EU, by opting for case studies as they possess different competitiveness profiles and distinct patterns of social cohesion and sustainability;

ii) to take into consideration a variety of spaces, keeping in mind:

   a. the population structure and its incidence in areas with urban and rural characteristics (via typologies referring to the Functional Urban Areas and to urban-rural relationships);

   b. the relationships between urban and rural areas via the typology referring to urban-rural relationships);

c. the cities' growth dynamics (via the typology referring to the Functional Urban Areas/MEGAs);

d. the accessibility/connectivity, introducing a dimension of territorial integration that deals with spatial integration capacity (via the PIAs typology);

As the tender pointed out, the sample of proposed regions should be selected in function with the typologies of regions developed within the ESPON Programme, specifically those from Project 1.1.1. – "The role, specific situation and potentials of urban areas as nodes in a polycentric development" (2002-2004) and Project 1.1.2. – "Urban-rural relations in Europe" (2002-2004).

iii) to secure that it represents regions with different potentials and handicaps, reflecting the diversity of the enlarged EU. Thus, we consider the classification of regions by type of issues and structure of EU funding by their identification in Objective 1 and Objective 2 regions;

iv) to secure a multi-level approach, implying that sample regions will be able to correspond to NUTS3 or groupings of two or more NUTS3 (which may comprise a NUT2). In choosing these multi-level cases, we shall seek to understand what type of relationship exists between the various NUTS3 and whether they contribute towards an **increase in integration/cohesion** among the various sub-regions (NUT3).

A multi-level approach allows for an assessment of whether or not a polycentric spatial organisation exists and in what way this organisation contributes towards the increase of economic competitiveness in such spaces. In that case it will be interesting to create the conditions for an analysis of the level of transnational or trans-border **integration/cooperation**, thus illustrating the importance of the EU INTERREG III Initiative (in domains such as infrastructure, support for economic activity, rural development, etc.) in the increase in spatial cohesion.

Table 6 -Summary of criteria for the selection of case studies

Criteria
i) Geographic representatively of the EU
ii)Variability of spaces considering different economic, social and settlement structures
iii) Different potentials and handicaps
iv) Multi-level analysis (NUT III and NUT II) and Multi-regional scope (transnational and transborder regions)

This facet is particularly evident in the larger FUA, where the phenomenon of metropolisation is directly linked to the territorial and spatial competitiveness, with a variety of implications for cohesion and sustainability.

The criteria **i)** and **ii)**, traduces the territorial dimension of the analysis, while **iii)** and **iv)** gave a political (spatial) dimension to the analysis, as it considers levels/profiles of regional policy developed in EU.

In this sense, it appears pertinent that the selected regions should fit into an approach engendered by multidimensional spatial principles that must take three fundamental objectives/principles into account (as discussed Chap. 2):

- sustainability
- cohesion
- integration

Thus, the selected regions will need to test not only the efficacy of the synthesis indicators but also identify how various forms of governance (namely public and private funding systems) introduce differentiated effects in sectorial and spatial policy. In other words, in addition to grasping the implications for regional economic competitiveness, the selected regions will entail the identification of the relationship between systems of governance and the results of policy conducive to the increase in competitiveness and territorial cohesion.

Nevertheless the implementation of this methodology has some strength that must be pointed:

i. the unavailability of information for the new accession countries (namely more specific indicators, time series and different NUT levels) will restrict the possibilities to secure the first defined criteria – the 'representability' and geographic diversity of the EU

ii. the unavailability of information in specific domains, namely more qualitative domains that allow to measure some of the basic proposed definitions (as "economic competitiveness", "social competitiveness" and "environmental competitiveness") respect to the traditional vision;

iii. the changes of context of Lisbon and Gothenburg strategies. These had been developed in a specific geographical context and, despite enlargement process have been take in consideration, the evolution shows that some of the main goals to attend to 2010 and 2013 have necessarily changed; the cohesion and regional development policy for the next years have been restructured in four domains, facts that are related with Lisbon and Gothenburg goals. The statistical data system has not a complete up date information to evaluate some of the very recent changes.

In this context, **it is important to conciliate the pre-defined methodological criteria and go beyond the problems of information availability. Two parallel approaches for this have been considered**:

- a Principal Component Analysis for Austria, Belgium, Chez Republic, German, Denmark, Estonia, Spain, Finland, France, Greece, Hungary, Ireland, Italy, Lithuania, Latvia, Luxemburg, Netherlands, Poland, Portugal, Slovenia, Slovakia and UK have been done. These countries have available information for NUT 3 and for the 5 chosen indicators. The Principal Component Analysis gives four groups, of which sample regions is chosen;
- for the countries that don't have available information for NUT 3[13], a parallel process of selection have been considered, in order to complement the Principal Component Analysis selection and to secure an equitable geographical representation of all EU territorial. The procedure was:
    a. in the case of Malta, we select the two geographical units in which the country is divided – "Malta" and "Gozo and Comino";
    b. in the case of Cyprus, we selected the only geographical unit – Cyprus
    c. in the case of Sweden the selection is supported in the indicator "GDP, per capita in pps in 2002" and in the classification of 76 MEGAs made in ESPON 1.1.1. Three different classes have been considered (<100% of EU average; 100-125% of EU average; >125% of EU average) and 6 NUTS 3 have been selected: with >125% of EU average, Stockholm and Vastra Gotalands Laem (Gothenburg); with 100-125% of EU average, Skåne län

[13] For some NUT 3 it was impossible to have data for all variables due to: absence of typologies classification at NUT 3 level, namely for the Swedish territory; mismatches on the several databases used related to NUT 3 identification; absence of information for the outside EU regions (Switzerland, Bulgaria, Romania and Norway).

(Malmö) and Uppsala Laem; and with <100% of EU average, Gotlands Laem and Hallands Laem.

d. in the case of Norway, the selection is also supported in the indicator “GDP, per capita in pps in 2002” and in the classification of 76 MEGAs made in ESPON 1.1.1.. Three different classes have been considered (<100% of EU average; 100-125% of EU average; >125% of EU average) and 6 NUTS 3 have been selected: with >125% of EU average, Oslo and Hordaland ; with 100-125% of EU average, Sor-Trondelag and Telemark; and with <100% of EU average, Oppland and Finnmark;

e. in the case of Suisse, because of “GDP, per capita in pps in 2002” is very high in all regions, the selected regions corresponds to the maximum values (Zurich and Bern) and the minimum (Valais). The maximum values of GDP also correspond to Suisse MEGAs cities classified in ESPON 1.1.1.;

f. in the case of Bulgaria and Romania, because of “GDP, per capita in pps in 2002” is very low in all regions, the selected regions corresponds to maximums values (Sofia, Timis and Bucharest regions). They also correspond to MEGAs cities classified in ESPON 1.1.1.

Nevertheless, it is important to highlight that the main aim of the sample of regions, will be to test the efficiency of new synthesis indicators and their measurements in the respective source countries as well as to assess the spatial impacts of different sectorial policies relevant for the implementation of the Lisbon/Gothenburg Strategies.

This means, that **it will not be possible to test efficiency of new synthesis indicators in regions that have not detailed information**. In order to solve this strength, starting from the previous chosen regions**, a more detailed and evaluative work could be done, that corresponds to case studies approach**.

In methodological terms, meanwhile the sample region will give the opportunity to test the evaluative methodology in a large scale, the restricted case studies approach will give a more detailed characterisation and evaluation processes (these cases will be select after the first methodological test made in the sample regions).

For questions of availability of information, these case studies will be preferably chosen in the countries that comprise the working group (Finland, Italy, the Netherlands, Portugal, Slovenia, Spain and the United Kingdom), as they possess different competitiveness profiles and distinct patterns of social cohesion and environmental sustainability (see Appendix 3).

4.2. The sample of regions[14]

Of the series of typologies presented in the ESPON Programme, two whose spatial and territorialdimensions are most evident stand out and, for this reason, they were chosen as the starting point in choosing the case studies. They are Project 1.1.1 - "The role, specific situation and potentials of urban areas as nodes in a polycentric development" (2002-2004)[15] and Project 1.1.2 – "Urban-rural relations in Europe" (2002-2004)[16] (for details see Appendix 4).

The sample should take the explained criteria, as they portray differentiated facets of organisation and land use and, therefore, contribute

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[14] In order to obtain a more representative sample regions, all methodological process have been remaked in the present Interim Report. This changes also answer to ESPON CU and DG Regio comments to First Interim Report

[15] ESPON Project 1.1.1 - "The role, specific situation and potentials of urban areas as nodes in a polycentric development" (2002-2004) identifies 1595 Functional Urban Areas (FUAs) with more than 50,000 inhabitants, of which 149 are metropolitan areas and 76 were classified as *Metropolitan European Growth Areas* (MEGAs).

[16] ESPON Project 1.1.2. – "Urban-rural relations in Europe" (2002-2004), take in account two dimensions of analysis were taken into consideration:

- the ***degree of urban influence***[16], defined according to population density and status of the leading urban centre of each NUTS3 area;
- the ***degree of human intervention***[16], measured by the relative share of land cover according to the main land cover classes of the CORINE data set (artificial surfaces, agricultural areas and residual land cover).

towards a response to questions such as how to confirm the importance of small and medium-sized cities in peripheral regions as anchors of regional competitiveness and instruments of territorial cohesion (in their urban-rural relationships), how to characterise the dynamics of competitiveness and cohesion in regions with a sprawling urban population system, or how to assess the importance of connectivity / accessibility in spatial and territorial integration at various scales.

Considering the ESPON typologies, a first methodological step towards the selection of a sample of regions to consider in the present study is done: a) indicators selection; b) a Principal Components Analysis was employed to obtain a typology of territories; c) and the selection of cases supported in the Principal Component Analysis results/typology.

4.2.1. The Analysis and the sample regions

Keeping in mind what was said in section 4.1 (criteria to consider when choosing the sample) and Appendix 4 (characterisation of the most pertinent aspects of the ESPON typologies), choosing the sample of case studies should start with a reading of the following indicators for all NUTS3:

1. Typology of land use, population density and FUA population
2. Typology of urban-rural relations
3. Accessibility index supported in a typology of multi-modal accessibility
4. GDP per capita, pps, 2000
5. Type of problematic that characterise territories (identification of Objective 1 Regions[17] and Objective 2[18] Regions)

[17] Objective 1 of the Structural Funds is the main priority of the European Union's cohesion policy, which corresponds to supporting development in the less prosperous regions.

[18] Objective 2 of the Structural Funds is to convert regions or parts of regions seriously affected by industrial decline.

The indicators don't have a hierarchical order but have an identical importance.

Table 7 - Indicators considered in choosing the sample of case studies

Dimensions	Indicators
From a Territorial Dimension	Typology of urban-rural relations
	Typology of land use, population density and FUA population
	Accessibility index (Typology of multi-modal accessibility)
To a Political dimension	GDP per capita, pps, 2000
	Type of problematic that characterise territories (identification of Obj. 1 and Obj. 2 Regions)

Another aspect that must be pointed is that in the First Interim Report, a 6th indicator ("Relation of rurality") was considered in the Principal Component Analysis. Nevertheless, the "Relation of rurality" measures a phenomenon that is also represented in indicator 2 - "Typology of urban-rural relations", as had been tested in the Principal Component Analysis made for the First Interim Report.

So, this 6th variable ("Relation of rurality") was removed from the present analysis. This means that all methodological process have been remake in the present Interim Report. These changes also answer to ESPON CU and DG Regio comments to First Interim Report.

These present five indicators reflect, on one hand, the territorial dimension of the regions (their "structural" and "functional" characteristics - as in the cases of the typologies 1.1.1 and 1.1.2) and, on the other, their economic-political dimension (represented in the classification of regions according to the type of issue affecting them: Objective 1 Regions and Objective 2 Regions). The classes considered in each indicator are:

1. The “Typology of land use, population density and FUA population” considers 8 different classes:

   1A=Urban, densely populated and high urban integration

   2A=Urban-rural, densely populated and high urban integration

   2B=Urban-rural, not densely populated but high urban integration

   2C=Urban-peripheral, not densely populated and low urban integration

   3A= Rural-urban, densely populated and high urban integration

   3B= Rural-urban, not densely populated, but high urban integration

   3C= Rural-urban, not densely populated, and low urban integration

   4A= Peripheral urban densely populated and high urban integration

   4B= Peripheral rural, not densely populated and high urban integration

   4C= Peripheral rural, not densely populated and low urban integration

2. The indicator that corresponds to the “Typology of urban-rural relations”, take in account 5 different regional types:

   1. High urban influence, high human intervention;
   2. High urban influence, medium human intervention;
   3. High urban influence, low human intervention;
   4. Low urban influence, high human intervention;
   5. Low urban influence, medium human intervention;

3. The indicator that represents “Accessibility index supported in a typology of multi-modal accessibility” classifies territories in 5 different classes according to its level of accessibility/integration level:

   1. very central;
   2. central;
   3. intermediate;

4. peripheral;

5. very peripheral

4. The fourth indicator is “GDP per capita (pps) in 2000”, and is grouped in 6 different classes:

1 - <25% of EU average

2 – 25% to 50% of EU average

3 – 50% to 75% of EU average

4- 75% to 100% of EU average

5 – 100% to125% of EU average

6 - >125% of EU average.

5. The last indicator identifies regions that are Objective 1[19] and Objective 2[20].

Table 8 - Classes considered in each indicator

Typology of land use, population density and FUA population	Typology of urban-rural relations	Typology of multimodal accessibility	GDP/Capita, peps, 2000	Regions Objective 1 and 2
1A=Urban, densely populated and high urban integration	1. High urban influence, high human intervention	very central	1 - <25% of EU average	1
2A=Urban-rural, densely populated and high urban	2. High urban influence, medium human intervention,	central	2 -25 to 50% of EU average	2

[19] Objective 1 of the Structural Funds is the main priority of the European Union's cohesion policy, which corresponds to supporting development in the less prosperous regions.

[20] Objective 2 of the Structural Funds is to convert regions or parts of regions seriously affected by industrial decline.

integration				
2B=Urban-rural, not densely populated but high urban integration	3. High urban influence, low human intervention,	intermediat e	3 – 50 to 75 of EU average	
2C=Urban-peripheral, not densely populated and low urban integration	4. Low urban influence, high human intervention,	peripheral	4- 75 to 100 of EU average	
3A= Rural-urban, densely populated and high urban integration	5. Low urban influence, medium human intervention	very peripheral	5 – 100-125 of EU average	
3B= Rural-urban, not densely populated, but high urban integration	6. Low urban influence, low human intervention,		6 - >125% of EU average	
3C= Rural-urban, not densely populated, and low urban integration				
4A= Peripheral urban densely populated and high urban integration				
4B= Peripheral rural, not densely populated and high urban				

integration				
4C= Peripheral rural, not densely populated and low urban integration				

Source: ESPON DATA BASE

These 5 indicators and all of its classes will be considered in the Principal Component Analysis, as presented next.

4.2.2. The results of the Principal Components Analysis

The principal component analysis extracted two components with an eigenvalue above one. Those components explained almost 3/4 of the total variance: almost half (49,65%) with the first one and the rest (25,25%) with the second one.

Table 9 - Eigenvalues of Principal Components Analysis

Factor	Eigenvalue	% of explication	Cumulative % of explication
1	2,978950	49,64917	49,64917
2	1,515002	25,25003	74,89920

The first component is strongly positive correlated with the accessibility typology of multi-modal accessibility, "typology of land use, population density and FUA population" and "GDP/Capita, pps, 2000", and, in opposition, a strong negative correlation with the "Urban-rural typology" and "Regions Objective 1".

This component **expressed an opposition between the NUT3 with a higher accessibility, mainly urban and richer than the others more rural and with economic development debilities**. This is the main differentiation that could be stressed out from the chosen indicators.

The second component shows mainly the **differentiation between the Objective 1 and Objective 2 eligible areas**, highlighting the industrial depressed areas in face with the less developed ones.

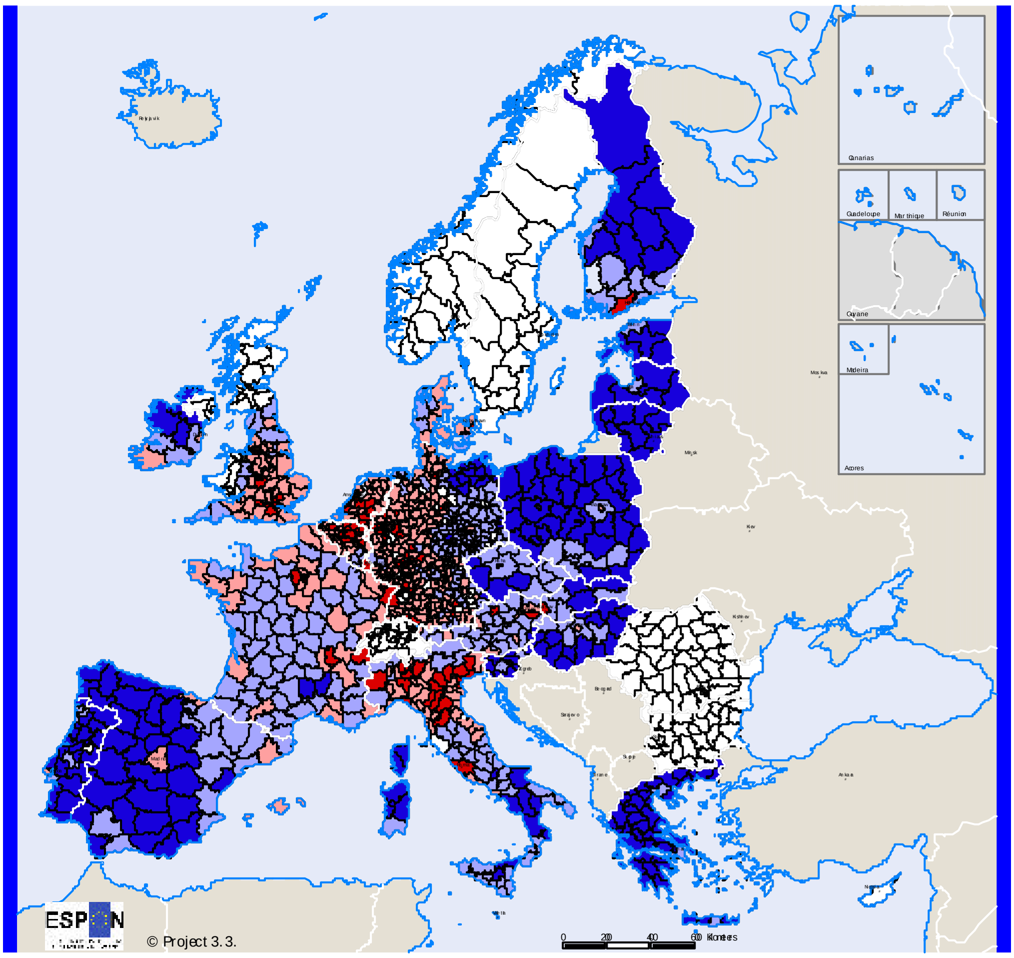
Table 10 - Loadings Matrix

Indicators	Factor 1	Factor 2
GDP/Capita, pps, 2000	0, 739028	-0,348558
Typology of land use, population density and FUA population	0.756037	-0.477389
Typology of multi-modal accessibility	0.816017	0.198553
Regions Objective 1	-0.740452	0.524530
Regions Objective 2	0.309123	-0.781117
Typology of urban-rural relations	-0.742621	-0.490827

The mapped scores of component 1 identify opposition of central and peripheral regions in Europe, showing a major number of NUT 3 in Germany, Belgium, west France and Paris region, Luxembourg, the axe from Kent region to Manchester through London, an set of northern Italian regions and, in a relative peripheral/central position, Barcelona, Madrid and Rome. The more peripheral areas are in northern Finland, Greece, Portugal, west Ireland, southern Italy and in general the regions in the accession countries.

Figure 5 - Component 1

Scores, by NUT3



Factor 1

Source: EU

Rural Peripheral Areas

< -1 Std. Dev.

-1 to 0 Std. Dev.

0 to 1 Std. Dev.

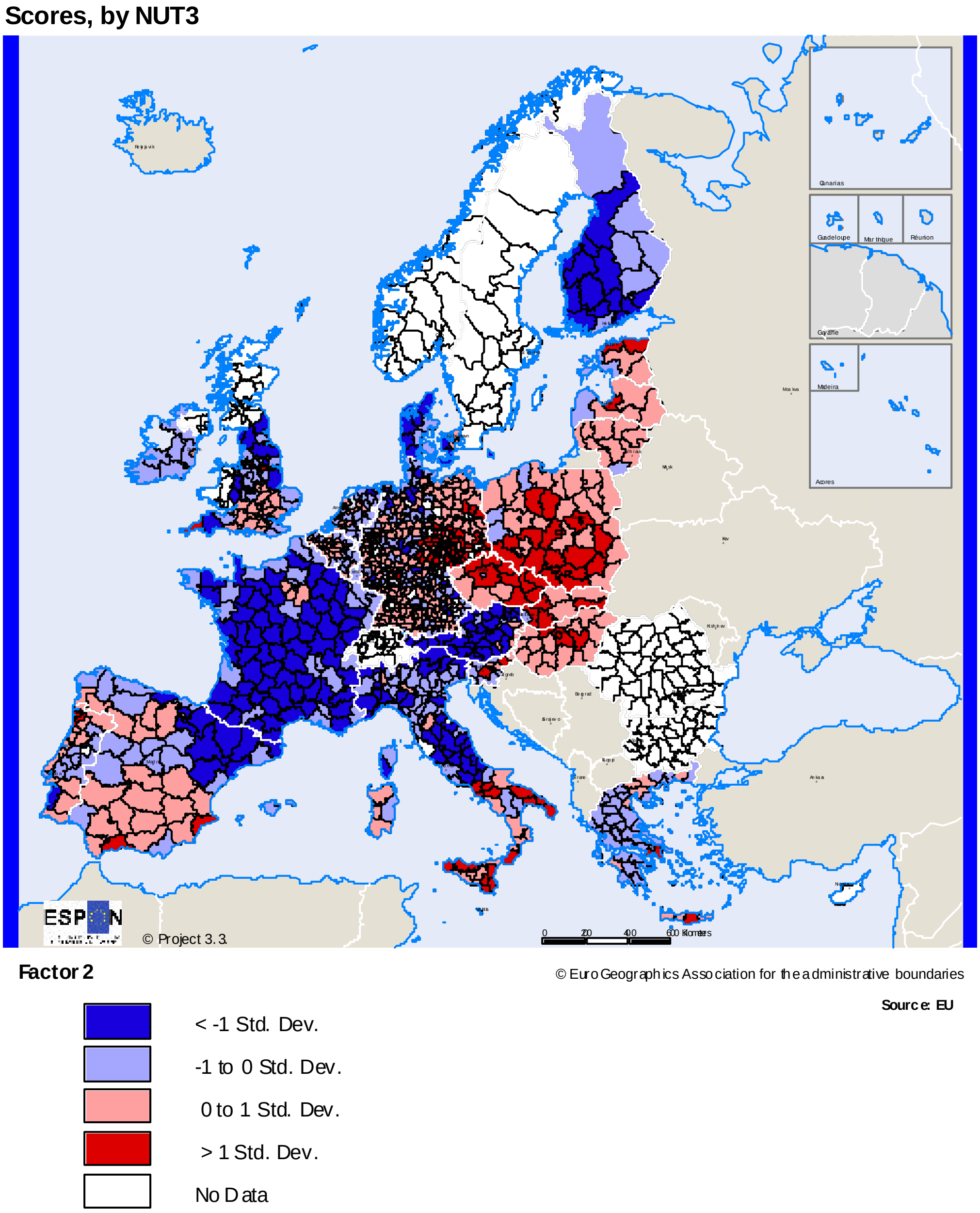
> 1 Std. Dev.

Urban Central Areas

No Data

On the other hand, the mapped scores of component 2 are not so interesting of analyse, because they follow the map of Objective 2 eligible areas.

Figure 6 – Component 2

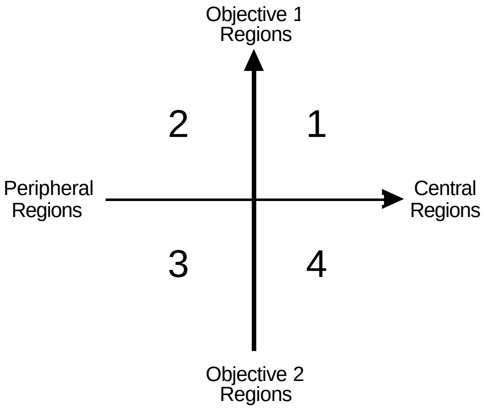


Although, **these two components synthesise the differentiation according the territorial dimension** (supported by the territorial typologies) **and the territorial political dimension (**supported by the differentiation related with typologies of regions objective 1 and 2).

The scores reveal the relative position of every NUT 3 region in each component and, as the same time, its position relative the territorial and political dimensions. The **scores results have supported largely the sampling exercise in order to choose the regions set**, and from the scores we have obtained a more balanced sample, related with geographical diversity and the territorial and political dimension.

Crossing the two components and plotting the respective scores we have obtained four boxes that was used to choose different NUT 3, according is factorial position, as showed in figure 3. This methodology allowed us to choose not only the more differential behaviour according each component, but also consider intermediate positions according to is position on both components at same time.

Figure 7 - Components 1 and 2 crossing



4.2.3. The sample of regions

As can be proved by the following table results, the sample of regions is equitable, either we consider the levels of economic performance, either the settlement structure and the urbanisation profile, as well, the political dimension:

- 1/3 of regions have a GDP per capita above 100% of EU average; about 21% have a GDP per capita, between 75%-

100% of EU average; the remaining have less than 75% of the EU average: this distribution will answer to the new geographical context and regional profile of the enlarged EU;

- half of the regions have "high urban influence and High human intervention";
- the MEGAs are represented and classified by different patterns of land use.

Table 11 - Some characteristics of sample region - Classification by "GDP per capita, pps" and "Combined Index of PCA"a)

GDP, per capita, pps, 2002	Groups obtained in the PCA a)				Complementary methodology b)	Number of chosen Regions
	1	2	3	4		
<25% of EU average		3				3
25%-50% of EU average		12	1			13
50%-75% of EU average	2	22	8	3		35
75%-100% of EU average	7	8	8	12		35
100%-125% of EU average	2		4	17		23
>125% of EU average	11		1	21		33
Complementary methodology b)					19	19
Number of chosen NUTs 3	22	45	22	53	19	161
%	13,7	28,0	13,7	32,9	11,8	100,0

a) the position of each NUT3 related to the combination of component 1 and component 2

b) for the countries that don't have available information for NUT 3, a parallel process of selection have been considered: the selection is supported in the indicator "GDP, per capita in pps in 2002" and in the classification of 76 MEGAs made in ESPON 1.1.1.

The combined analysis allows for the definition of the following spatial typology:

1. Regions with metropolis that structure the polycentric European urban system:
   - That include “Strong MEGA” and “Potential MEGA” areas outside of the *Pentagon*, as potential nodes in the polycentric European system;
   - That include “Weak Mega”, as well as potential nodes of the polycentric European urban system, making it important to assess their competitive and spatial dynamics;
   - With “High urban influence and high human intervention” or “High urban influence and medium human intervention” and without MEGAs, allowing for an assessment of economic competitiveness and of the importance of the polycentric organisation at the mid-scale;
   - Which represent competitive and central regions, with low levels of rurality and high levels of accessibility / connectivity, some of them in restructuring process (Objective 2 Regions);
2. Regions with “Low urban influence and low human intervention” or “Low urban influence and medium human intervention”, representing less competitive regions, with a high level of rurality and being very peripheral in terms of accessibility / connectivity, with a large part of them being supported by Objective 1 funds;

Table 12 - Some characteristics of sample region – Classification by "Urban-rural typology" and "GDP per capita, pps"

URBAN- RURAL Typology	GDP per capita, pps, 2002 - % of EU Average <25%	25%-50%	50%-75%	75%-100%	100%-125%	>125%	Complementary methodology b)	Number of chosen NUTs 3
High urban influence; High human intervention		3	16	22	18	29		88
High urban influence; low human intervention				1	2	1		4
High urban influence; medium human intervention		3	2	1		1		7
Low urban influence; High human intervention		4	3	2	2			11
Low urban influence; medium human intervention	2	1	6	4	2	1		16
Low urban influence; low human intervention	1	1	8	5		1		16
Complementary methodology[b)]							19	19
Total Number of chosen NUTs 3	3	13	35	35	24	33	19	161
%	1,9	8,0	21,6	21,6	14,8	20,4	11,7	100,0

b) for the countries that don't have available information for NUT 3, a parallel process of selection have been considered: the selection is supported in the indicator "GDP, per capita in pps in 2002" and in the classification of 76 MEGAs made in ESPON 1.1.1.

3. Another group that correspond to regions with "High urban influence and low human intervention", represented by high-density areas organised in a sprawl settlement model and regions with "Low urban influence and high human intervention".

In addition to the above mentioned criteria, another criterion was considered: participation in the EU INTERREG III Initiative (Appendix 4.). Some of the chosen regions are include in the various sub-programmes that comprise this Initiative, as can be seen in table above. About 54 NUTs 3 that belong to CADSES have been chosen, 45 of North West Europe and 47 of Baltic Sea, the most numerous transnational cooperation regions. Also have been chosen regions that belongs to the other INTERREG III B programme.

Table 13 - Some characteristics of sample region – Classification by "Typology of land use, pop. density and FUA" and "Classification of MEGA"

Typology of land use, population density and FUA population	Classification of MEGA					Regions no MEGAs	Number of chosen NUTs 3
	European Engines	MEGA Global Nodes	Potential MEGAs	Strong MEGAs	Weak MEGAs		
Low urban influence, medium human intervention						5	5
Peripheral rural, not densely populated and high urban integration					2	8	10
Peripheral rural, not densely populated and low urban integration						7	7
Peripheral urban densely populated and high urban integration			1			2	3
Rural-Urban, not densely populated			1		1	3	5

but high urban integration							
Rural-urban, not densely populated, and low urban integration					2	14	16
Urban densely populated and high urban integration	7	6	7	5	7	4	36
Urban-peripheral, not densely populated but high urban integration						5	5
Urban-rural densely populated and high urban integration	6		12	3	8	22	51
Urban-rural not densely populated but high urban integration						4	4
Complementary methodology[b)]	3		5	3	4	4	19
Total Number of chosen NUTs 3	16	6	26	11	24	78	161
%	9,9	3,7	16,1	6,8	14,9	48,4	100,0

b) for the countries that don't have available information for NUT 3, a parallel process of selection have been considered: the selection is supported in the indicator "GDP, per capita in pps in 2002" and in the classification of 76 MEGAs made in ESPON 1.1.1.

Table 14. Distribution of Case studies by INTERREG III – B sub-programmes

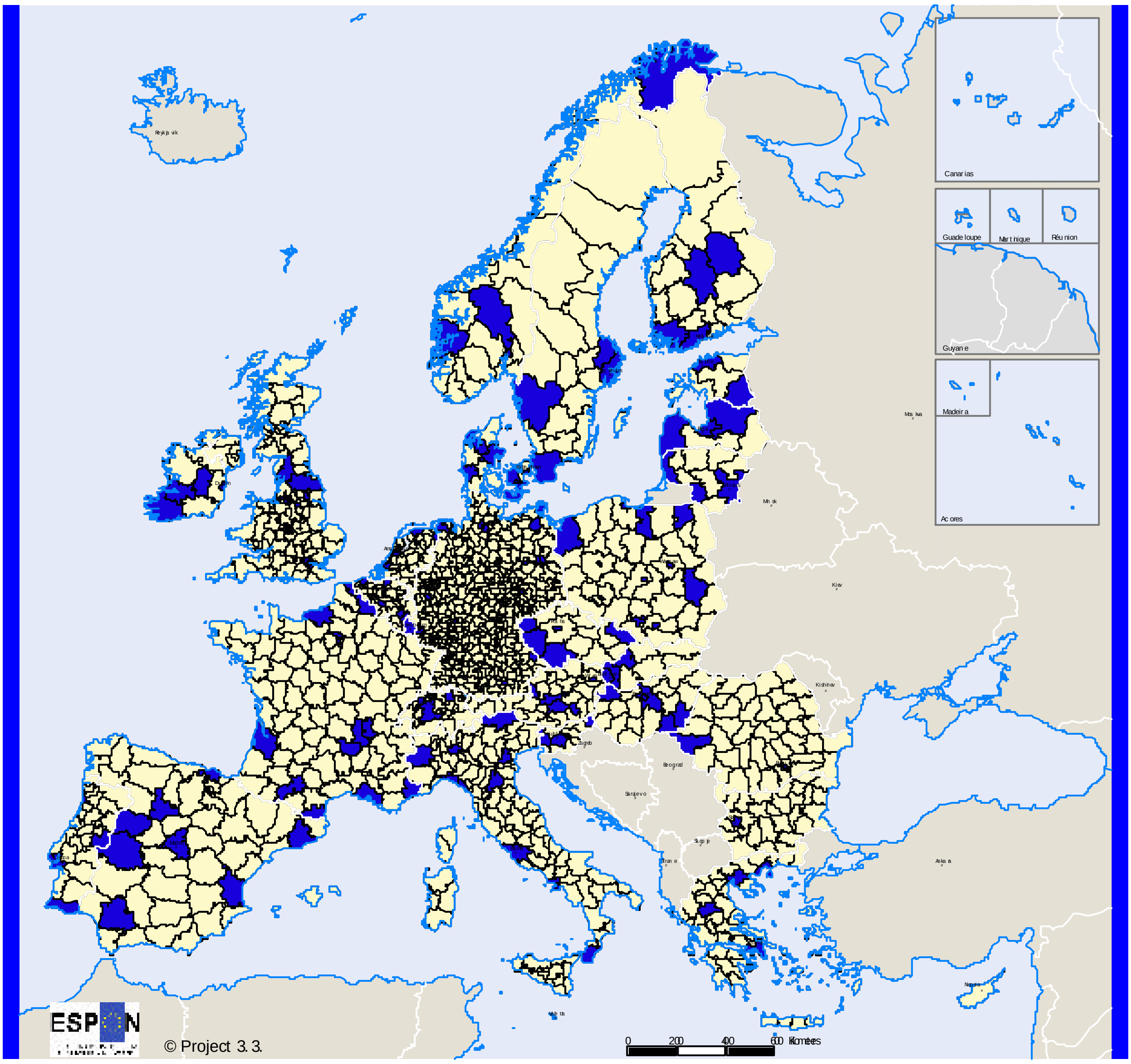
INTERREG 3B Cooperation Areas	Number of chosen NUTs 3
Northern Periphery	5
North Sea	30
Baltic Sea	47
North West Europe	45
Atlantic Area	20
CADSES	54
South West Europe	17
Western Mediterranean	19
Alpine Space	17
Archimed	8

In this context, regions with very different profiles stand out, such as the Central "Potential MEGAs" which include Turin or Glasgow or, in the opposite, regional-local areas that are less competitive and highly rural like "Beira Interior Sul" and "Cáceres" (both Objective 1 Regions and belonging to INTERREG III A).

The map shows the version of the regional sampling, but for more details see APPENDIX 3, where a complete list of chosen NUTs is presented.

Figure 8

Case Study Sample, by NUT3



© EuroGeographics Association for the administrative boundaries

Case Study Sample

Source: EU

A final note seeks to emphasise that the regional sampling proposed should be tested and correspondingly adjusted over the next months of work. The adjustment can be justified according to two main sets of reasons. On one hand, internal factors contributing to the evolution of the project, such as the following, must be considered:

- The evolution and revalidation of the indicators described in WP2;
- Attending to a framework of policy orientations considered pertinent to the objectives, as described in WP5;
- Being discussed thoroughly enough during the next group meeting, so that the proposed sample regions can be applied to the project's objectives as fully as possible.

On the other hand, there are external reasons that may lead to a readjustment of the sample proposed in this first report that include the following:

- Difficulties in obtaining statistical information for some of the EU countries. This situation is particularly the case with the new EU member-states and the other four states in ESPON project (Switzerland, Romania, Bulgaria and Norway);
- Difficulties in obtaining statistical information for the NUTS3 and NUTS2;
- Difficulties in obtaining additional information in the case that the regions chosen belong to countries that are not represented in the network, which only has a representation of seven of the 25+3.

5. First policies/scenarios suggestions

5.1 Introduction

In the review below, a range of issues relevant to the Lisbon and Gothenburg are extrapolated from the findings of past and current ESPON projects. For each project, recommendations, scenarios and the implications for competitiveness and sustainability are considered, where evident and appropriate. Finally, draft work from the parallel project 3.2 (Spatial Scenarios) is outlined, most notably some preliminary research relating to scenarios for achieving the Lisbon agenda.

5.2 Summary of ESPON policy recommendations in relation to the Lisbon/Gothenburg strategy

The main work of the ESPON projects focuses on the comparative advantages of European regions, for instance in locating 'hotspots' and 'cold spots'. Projects also focus on the economic performance of regions and the level of employment in a region as well as where important development factors such as R&D, accessibility, ICT, nature and cultural assets are located. With regard to the fulfilment of the Lisbon objectives, this territorial perspective indicates that not all regions are potential 'Lisbon areas'. In other words, they cannot all rely on a knowledge based economy given the limitations of personnel and infrastructure. Consequently, some regions need to develop their economic base around other assets as well. Innovation capacity is shown to be variable across the EU. For example, it is greater in the North than in the South of the EU, and more prevalent in larger cities. Improvements in R&D performance will need targeted measures, for example building human capital and institutional learning through education.

The 'territorial roll-out' of the information society is not unproblematic and will depend on the establishment and acceptance of ICT infrastructure. Indeed, there are specific issues relating to the practicality of this in remote areas with low population density. Overall, the successful development of regions requires integrated packages of initiatives, and cooperation and coordination between sectors, policy areas at national and regional levels. In general though, enhancing European attractiveness would be supported if the European regions better exploited their diverse potentials.

The detail of these policy recommendations as well as reference to the research upon which they are based is discussed below.

5.3 Thematic project reviews

Polycentric development (1.1.1)

Polycentrism is presented by this project as a bridging concept between economic growth, traditionally associated with efficiency and concentration and balanced development, associated with de-concentration. It is proposed as a means of achieving both economic competitiveness and environmental sustainability. Where GDP per capita is an indicator of competitiveness, polycentric regions are shown to be more competitive, though the strength of the relationship is disputed.

Policy recommendations

Strategies to achieve moves towards the promotion of polycentricity at the regional and national level included the use of Structural Fund regulations and Interreg to boost 'second tier urban areas' and encourage countries and regions to analyse their urban structures, promote networking and the development of common strategies to cover several cities and cross-border regions. Areas outside the Pentagon should thus form strategic co-operation as a means to improve their global competitiveness.

At the macro level the main emphasis is on regions outside the Pentagon, the dominant policy objective being to move away from the EU having only one 'zone of global economic integration' based around the core area, to the establishment of new zones able to compete internationally. Therefore, stimulating a polycentric structure should contribute to the competitiveness of Europe. Key objectives for these policycentric areas should be functional specialisation, supported by the completion of long-term EU based initiatives (such as the TENs network), to strengthen the performance of competing EU territories in a competitive global context. Structural Funds must be targeted explicitly towards counterbalancing tendencies towards further concentration.

Scenarios

Two preliminary scenarios are presented; the first is a continuation of current trends, resulting in a persistence of a single global economic zone, with peripheral areas unable to compete on the international stage. The second, the 'ideal situation scenario' shows increased polycentricity at the intra-urban level (*micro*) makes city regions stronger and therefore produces a more polycentric national or trans-national urban system (*meso*). In the next step, stronger functional areas at the *meso* level can work together to produce strongholds for a more balanced Europe, heralding the eventual emergence of several Global Integration Zones in addition to Pentagon (*macro*). This scenario would be the consequence of interventions as elaborated in detail in the Final Report of 1.1.1.

Implications

The conclusions of this project demand a change in thinking about competitiveness. Rather than associating it with the economic attractiveness of large, particularly capital cities, attention is to be given to making available higher order services and developing functional specialisations to second and lower tier cities. This contributes to sustainable development, reducing the urban sprawl of monocentric capital cities, as well as broadening of the economic base of areas such that they are capable of competing internationally.

Urban-Rural Relations (1.1.2)

The implications for the Lisbon and Gothenburg agendas for the project on urban-rural relations are less explicit than project 1.1.1, but some data drawn mainly from their review of changes in this sphere are relevant.

Policy *recommendations*

Current trends extrapolated by 1.1.2 (in particular the enlargement of functional urban areas) have contributed to an increasing flexibility of employment opportunities. While this has been positive for competitiveness, its association with an increase in work-related travel and the use of private cars has been negative for sustainability. The protection of rural assets is proposed as a recommendation for sustainable development and more tenuously a contribution to territorial competitiveness in terms of 'added value'. Specific policy recommendations are based on area types, however some of those focusing on strengthening the economic base are difficult to visualise. For example, struggling rural areas would benefit from economic diversification that in turn would improve functional urban-rural relations. However, this is harder to achieve the less accessible the rural area is – a consequence of the need for urban markets.

The project concludes with the warning that interdependence between urban and rural areas 'should not be promoted for its own sake' as the implications for increased interaction may not be environmentally sustainable.

5.3.3 Enlargement and polycentrism (1.1.3)

Enlargement of the EU has been presented by some policy makers as a possible brake on the potential of achieving the Lisbon objectives. The perspective of the team working on this project is to assess the process from the point of view of an opportunity. This can be seen in spatial terms through the development of a new Central Eastern zone of global competitiveness, and in terms of the scope for 'catch up'. As environmental objectives have been a priority in much pre-accession aid, sustainability goals have also been respected in the convergence process.

Policy recommendations

Project conclusions suggest that enlargement represents one of the most important opportunities for the EU to increase international competitiveness, and is precisely in line with the Lisbon/Gothenburg strategy. The reality though, is less promising. Economic restructuring is occurring in the enlargement area from primary sectors to the service sectors, but employment levels have fallen.

The project thus takes up the particular effects of enlargement by focusing attention on the discontinuities and barriers implicit in successful economic integration. Policy recommendations concentrate on identifying these and providing the results of their study on the Transnational Regions and Transnational Urban Networks (TUN) which show areas of the Enlargement area with the potential to compete with the Pentagon. A focus is placed on the risks and opportunities of enlargement by measuring the regional specialisation and geographic concentration of sector employment in the EU-12, and drafting typologies for particularly vulnerable regions. The special needs of border regions are highlighted with typologies based on the particular barriers to flows of people, goods, services and knowledge. In addition to particular 'remedial actions', the primary recommendation is that improving transport links within accession countries will not be sufficient, and that transport links between old and new countries also need to be prioritised.

Scenarios

Preliminary scenario work studying the effects of selected EU policies on the Enlargement area is presented in the form of 'policy combinations' (multi-level and inter-sectoral). 'Capacity-based' policy combinations are 'governance orientated' and 'bottom-up', while 'principle-based' policy combinations are more 'top-down' in perspective, geared at what interventions the EU might do to enhance the long term competitive potential of the accession states. Th latter include groups of policies targeted at co-operation, transport and cultural interventions. In addition to the focus on transport infrastructure investments in the new member states (and more particularly between new and old member states), suggest a new emphasis on the functional growth of second tier cities. EU funding should be provided to partnerships formed at the regional level - both to draft the plan and to secure its implementation. Small member states should profit from drafting plans in cooperation with neighbouring states. Such plans should include policies aimed directly at generating employment in second and lower order cities to increase competitiveness and cohesion in the EU as a whole.

The scenarios also contains region specific advice, most notably for the development of an additional zone of global importance, the promotion of the network of major cities in the "Triangle of Central Europe", with its potentially high level of integration and encompassing the area from Warsaw in the east, Poznan in the west and Budapest in the south. This Trananational Region has to strengthen its relationships with the Pentagon, the wider Baltic area, Poland and the Balkan region.

Demography and migration (1.1.4)

The ageing and general stagnation of the EU population is of direct relevance to future sustainability and competitiveness. One indicator of sustainability is the proportion of the population under 15, while indicators relating to competitiveness concern the vibrancy of the labour market.

Policy recommendations

In the context of future labour market problems, 1.1.4 focuses much of its attention to the role of immigration as the answer to projected workforce shortages. However, unlike several other demographic studies of Europe, its conclusions are that immigration is not a panacea to Europe's ageing and declining population. This recommendation is however subject to regional variation. Falling population in the Eastern European accession states means that immigration needs there are significant. But the EU15 it suggests has strong potential for improving its labour productivity and labour force participation rate - which will lower the need for immigration. Proposals to national governments stress that they should respond to demographic change and to potential labour shortage with a variety of policies and instruments, depending on the specificity's of each particular country or region. They present five broad categories of available interventions:

- Encouraging higher workforce participation through retraining of the unemployed, discouraging early retirement, increase female activity rate, by making it easier for women to combine work with childcare
- Postponing retirement ages, a process facilitated by longer active lives
- Improve labour productivity levels, by increasing capital investment and promoting the development innovation both in technology and organisation capacity
- Immigration policies
- Encouraging increase in fertility

They assert that it is also important to distinguish between short-term from long-term policy responses to a labour shortage. Immigration can only offer a short-term solution to the consequences of ageing. Long-term solutions, such as higher labour force participation rates, a higher retirement age or the stimulation of an increased fertility rate improve labour productivity, which is necessary to deal with the consequences of ageing.

Recommendations at the EU level are limited, as demographic and migration policies are still the preserve of national governments despite attempts to co-ordinate them. However the conclusions stress that different levels of income and education are key push and pull factors in all migratory movements. Therefore, the broad recommendation at the EU level must be to reduce such regional and national differences and increase the symmetrical economic development of the whole EU27/29 area, particularly to stem the flow of young persons from East to west and from the periphery to the core (which contributes to the existence of a single economic zone of global significance).

Implications

The projected acceleration of the ageing population and regional population losses are a particular challenge for the realisation of the Lisbon agenda. This is not only an issue in relation to the relative size and strength of the labour force, but also in the light of the associated fall in consumer demand, through the propensity of older people to save rather than spend

5.3.5 Transport services and networks (1.2.1)

The quality of transport infrastructures, in terms of capacity, connectivity, and travel speeds are shown to determine the competitive advantage of locations - this is often measured as potential accessibility.

Studies of potential accessibility show there are two overlaying core-periphery patterns - a national and a European one. The national pattern reflects the fact that spatial interactions are more intense within than between countries. Thus, regions in the periphery of their respective national market centres suffer from increasing transport costs, as their interaction with markets is more dependent on transport than more central regions. If transport policies reinforce polycentricity at the European level, by connecting large urban centres, they may reinforce the dominance of capital cities.

The implications of existing patterns and proposals for using new transportation options to strengthen polycentricity at different levels are ambiguous. The association between transport options and sustainability is more straightforward. Nonetheless transport connectivity is essential for the movement of goods and cannot be substituted by the electronic exchange of information. Recommendations from this project focus on a modification of existing transport forms and their use to effect a reduction in fuel consumption and moves to multi-modal forms of transport, such as a the development of rail for dedicated freight passage.

5.3.6 Telecommunication and networks (1.2.2)

Development in this field is key to the means by which the Lisbon/Gothenburg strategy is to be realised, it is also profoundly different to the nature of transport (c/f project 1.2.1) in that it is changing rapidly and has the potential to develop within areas not benefiting from physical connectivity to the European core.

Recommendations

Despite the potential for development across the EU, current strengths in telecommunication reflect an existing urban bias and territorial divisions. Project findings indicate that leaving further developments to the market will exacerbate existing divisions. Thus intervention is necessary to increase territorial competitiveness producing a broader polycentric base. As such, standardisation and subsidisation are required and the EU should participate in establishing better symmetry between public authorities and telecommunication providers.

However, a more positive trend is identified around the idea of a polycentric form of territorial development of telecommunications where fibre optic operators are investing in cities outside the traditional European core.

Scenarios

Much of the Final Report concentrates on intra-EU competition and the identification of regions and countries that are ‘lagging and those that are leading’. These are charted into three scenarios using the STIMA tool (investigating the spatial economic impacts of ICTs investments). Scenario A is based on indiscriminate policy, while scenario B discriminates in favour of more efficient regions and scenario C in favour of lagging regions. Apart from demonstrating the vital role of ICT for the creation of GDP, the scenarios impacts are fairly predictable except that they show that there are clusters of areas that are (and are not) able to respond dynamically to ICT policies.

5.3.7 Other ESPON thematic projects

Project 1.3.1 (Natural and technological hazards), which relates mainly to risk management, is relevant in that territorial competitiveness is compromised by potential and real hazards (such as floods or forest fires), and sustainability by actual hazard events. Indeed recent disasters have entailed heavier costs than any EU compensatory action could deal with. Policy recommendations emphasise that prevention should be the primary objective. Secondly, containment or reduction of the impact where the first is not possible should be sought, and that such measures should be incorporated into Structural Fund assistance (as they already are for many Objective 1 assessments). In this policy area the goals of sustainability and competitiveness are compatible - the problem is getting member states to apply recommended guidelines.

Project 1.3.2 (Natural heritage) has obvious significance for the sustainability agenda of the Gothenburg agreements, and in terms of 'added value' (geographical diversity, high levels of ecological protection) to Lisbon. In addition, it is highlighted that where natural resources are over-exploited, ultimately money has to be spent to rehabilitate those areas. The project considers the potential for the Natura 2000 proposed network of high quality semi-natural environments to support sustainability and add to the attractiveness for locating activities outside the Core, thus the scheme may indirectly support 'balanced development' away from the Pentagon. It recommends that Natura 2000 sites should be enhanced and other Europe-wide networks identified.

5.4 Territorial impact project reviews

5.4.1 Tens and Transportation Policy (2.1.1)

Recommendations and scenarios

In this project, the indirect impacts of transport infrastructure were investigated. New infrastructure produces changes in accessibility and thus increases economic attractiveness of certain places. Consequently, there is a positive relationship between the deployment of transport infrastructure and a rise in economic competitiveness. It is for this reason that a 'speeding up' of the TENs programme is necessary to overcome deficiencies in connectivity. However, increase in all forms of transport infrastructure is not necessarily consistent with the goals of sustainable development.

Here SASI scenario work undertaken by the project is informative. Ten policy scenarios covering various pricing measures and infrastructure investments (road/rail) were developed over a period up to 2021. While transport investments do have a positive impact, and particularly on the development potential of areas outside the Pentagon[21], relatively large differences in accessibility only translated into relatively small differences in GDP per capita.

Modal shifts, however, could offer major differences though in terms of meeting sustainability goals. Promoting new waterway connections could offer an alternative to road transport and more high-speed train networks are environmentally friendly alternative to air travel. Generally, relocating

[21] The best scenario offering positive economic impacts for East of the Pentagon/accession countries, with a view to stimulating an alternative zone of global economic integration, was the 'combined investment and marginal cost pricing. This depended on the realisation of TEN-T and TINA networks over the next two decades.

transport streams and modal shifts from road to rail and waterways should also be used as a means of reducing pressure on overloaded transport corridors that will produce benefits in terms of competitiveness.

However, the positive economic impacts that were predicted in the SASI model, were on the development of roads rather than rail lines and indicated raising transport costs[22] for environmental reasons had a significantly negative impact on economic development. In this policy area there seems to be underlying conflict between the political goals of economic efficiency, environmental sustainability and spatial equity.

Implications for competitiveness and sustainability

The project team are not optimistic in terms of accommodating both the principles embodied in the Lisbon and Gothenburg agreements. They reach the 'unavoidable conclusion that different objectives tend to conflict with each other'. Specifically '(you) can't expect a single design of transportation policy to be optimised to the pursuit of economic competitiveness, efficiency and the growth of the entire EU area (and simultaneously) provide environmental sustainability and a balanced spatial development'.

The conclusion from 2.1.1 suggests that in view of current thinking in transport policy, the goals of the Lisbon and Gothenburg agendas are going to be hard, in practice, to unite. Their assessment though (in the short, medium and long-term) favours the modal rebalancing and a reduction in fuel consumption.

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[22] Raising transport costs has been shown to support polycentricity. All transport scenarios, except for pricing, support monocentricity.

5.4.2 EU Research and Development Policy and Innovation (2.1.2)

Recommendations and scenarios

The Nemesis European macro-econometric model was used to assess the effects of all countries increasing their expenditure on R&D. If this level were to rise to the target level of at least 3% (and 4% by 2050), there would be GDP increases of 0.25% per year by 2010, rising to 0.5% of GDP thereafter (with the least R& D intensive countries catching up in productivity gains). This would result in a total increase in jobs of between 2 and 6 million by 2015 (and up to 18 million by 2030) reflecting a period of deployment of the effects of innovation, leading to sustained demand and an increase in the competitiveness of all European sectors.

The question however, is how can an increase in R&D expenditure be achieved? Although the model assumes that two-thirds would be contributed by industry (though the model does provide alternative calculations of the amount financed by the public sector, with projected improved gains in GDP and employment where this contribution is greater[23]) this is an ambitious target, particularly for some countries.

There are two problems with this optimistic analysis. Firstly, the current review of R&D intensity and personnel shows considerable disparity, based on the core-periphery pattern across the EU27, yet the gaps are narrowing apparently without being translated into economic wealth. The project team consider that this is a result of the innovation processes being insufficient to become a significant driving force. Secondly, where alternate scenarios of investment (STIMA model) were charted according to whether they targeted

[23] The model does not however account for any possible negative effects of government deficits on interest rates or the performance of economic groups.

strong areas, lagging areas or were indiscriminate, there were clusters of regions (lagging and non-lagging), which did and did not respond. The resultant recommendations include addressing innovation co-ordination, absorption capacity (particularly for weaker R&D areas) and providing different policies for different area types.

Maximising innovation potential requires successful inter-regional and trans-national collaboration. In this context, the team agree with the objectives of the proposed European Research Area (2000), that the current national fragmentation of research capacities leads to duplication, instead there must be a 'mutual opening up of programmes' and co-ordination of member states research strategies. The sectoral intervention of the RTD Framework Programme is important here. In addition, territorial interventions through the Structural Funds can be used by ensuring that minimum of 5% of Fund monies are dedicated to R&D within each regional project, especially in areas with GDPs below the 75% EU average (where co-funding should be implemented).

There should be a better coordination between the Framework Programmes (FP) and the Structural Funds (SF), which enhances the innovation capability of disadvantaged regions. The objective should be to strengthen those disadvantaged areas which possess the relatively best chances for catching up and establishing as competitive regions with a high innovation capability. Regarding the accessibility of broadband infrastructure (which shapes an essential element of the Lisbon objectives regarding Europe's way towards the leading knowledge society), some progress could be made on the roll-out of broadband infrastructure in less densely populated regions. This supply-side improvement of broadband access in these disadvantaged regions could be accompanied by boosting the demand for internet services delivered by broadband.

Area specific suggestions include the following: 'Type 5 regions' (exceptionally strong system of R&D and innovation) should be promoted as 'focal points of a 'European innovation system', other measures include fostering co-operation, networking and other links (pp175-6), which are also proposed for 'Type 4 regions' (strong R&D). 'Type 3 regions' ('mixed fortune') should, where possible, reinforce links with stronger regions. Where this is not an option, strengthening their regional capacity for R&D and innovation should be a priority so that they can then themselves act as 'trans-regional knowledge hubs'. Much of this is compatible with the conclusions of the first ESPON project on polycentricity (1.1.1). With weak R&D areas (Type 1&2) it is recommended that the private sector is harnessed to the improvement of the economic base and service infrastructure to promote the development of R&D.

Implications for competitiveness and sustainability

The 2.1.2 team conclude that the role of R&D and ICT are vital for future competitiveness, but more co-ordination and capacity building are needed together with an increase in spending to make a positive impact on the competitiveness of the EU.

R&D and associated innovations are unique in the sense that they may be seen as the answer to the desire for economic expansion without environment cost. They also do not depend on geographical connectivity, demographic concentration or other factors associated with economic growth, and unlike sectors such as transport, R&D is subject to rapid change. As such RDT is identified in Lisbon/Gothenburg as central to the success of the strategy. It is also distinctive in being well placed to impact the spatial structure of the EU territory- that is to stimulate competition away from the Core. However, precisely how to direct innovation policies to address current territorial imbalances and improve the overall competitiveness of the EU is not clear and the potential of the sector is limited to the partners involved in its implementation.

5.4.3 Common Agricultural and Rural Development Policy (2.1.3)

As the world's largest food trader, the EU has a strong interest in global competitiveness in the production of agricultural produce. At the same time agricultural methods, which maximise production can negatively impact on landscapes and habitats. The agri-environmental schemes proposed in Agenda 2000 and the establishment of the RDR (Rural Development Regulation) show a move to a focus on sustainability goals from the previous bias of the CAP[24].

Recommendations and scenarios

The project ran a series of policy scenarios assessing the likely outcome in competitiveness, cohesion and natural heritage of different options relating to the reform of the CAP. The radical liberalisation of agricultural policy (elimination of price support, quotas etc.) was predicted to support competitiveness, by leading to more territorial specialisation, some intensive, commercial agri-businesses, other areas turning to leisure and rural residential land use. This scenario though would be likely to undermine the objectives of sustainability, resulting in the loss of much natural heritage. The team recommend rather that the EU retain global competitiveness through a combination of quality and distinctiveness through maintaining its unique and varied pattern of rural resources.

[24] CAP received most criticism from the 2.1.3 team for running counter to the cohesion objectives of the ESDP, favouring prosperous, accessible regions and large mechanised farms.

In seeking to fulfil this objective the team broadly supports the Commissions' views on reforming EU agricultural policy, with a broader stress on RDP, more LEADER type projects and more emphasis on Pillar 2, in keeping with the goals of sustainable development. Their conclusions are reached primarily through case study work. These do reveal some agri-environmental schemes, which have had positive impacts on economic competitiveness at the macro level, if indirectly, by retaining rural populations and, in line with Gothenburg, producing good effects in terms of environmental sustainability. LEADER also is shown to have successfully built the basis for more competitiveness in areas previously struggling.

5.4.4 Energy services, networks and EU energy policy (2.1.4)

Recommendations and scenarios

The energy sector has parallels with the transport sector. Not only is 40% of energy used in transport (subsequently producing 28% of C02 emissions), but energy price increase also result in gains for sustainability with reduced consumption. Conversely low energy prices may boost competitiveness but have perverse effects on sustainability, reducing the drive for technological development and efficiency. In the scenarios (econometric models and simulations) presented, all except increased prices are shown as likely to have a negative impact on sustainability.

The proposed focus should be on decentralisation - local energy initiatives, these should stimulate local employment and income, reduce dependency[25]) and ultimately international competitiveness as well as being more sustainable.

[25] Most EU countries are currently net importers of energy and this is dependency has been increasing.

Specific policy recommendations, which are given initially on country basis, do address demand side issues in the context of global competition, transferring environmental costs to the user. Focus is also given to finding cost-effective ways of promoting renewable sources of energy designed to increase competition with current cheap imports. The problem is noted that the relation between regional development and energy policy vectors are not always obvious and it is suggested that the TIA should address this. The other obvious difficulty is the uncertainty of the future. This is stressed and the need for further scenario studies to address it is emphasised, an issue that project 3.2 is prioritising. As the partners of 2.1.4 propose, key questions include; 'will nuclear power emerge as a winner?' and 'what role for bio-fuels in the transport sector of the future?'

Implications for competitiveness and sustainability

As energy consumption is an indicator for sustainability the relevance to sustainable development is obvious. While there have been improvements in diversification and moves from fossil fuel use across the EU, alternatives have not been primarily renewable, and dependency on external imports and consumption remain high. The implications of this project suggest that if current levels of competitiveness are maintained in this way a major change is required. For sustainable development the projects findings suggest that a much more significant commitment to renewable energy supplies and local energy sources is required than the limited move that has been initiated in this direction.

5.4.5 Structural Fund Impacts (2.2.1)

Recommendations and scenarios

The project completes an assessment on the success of Structural Fund spending in narrowing the gap in GDP between lagging and non-lagging regions. The gap had been reduced per capita from 64% in 1993 to 69% in 2000. This shows an improvement in the territorial competitiveness of these regions, but not a substantial one. This limited impact is part of the rationale presented by the team, for a proposed move from redistribution to competitiveness potential in future proposed Structural Funding. They recommend a concentration of funding on existing and promising FUAs which are potentially internationally competitive or show the potential for becoming European hubs. This would involve the adoption of a spatially more explicit policy towards polycentricity and specifically focusing on the creation of strong urban poles outside the Pentagon and the establishment of trans-national functional regions, especially between EU15 and the new member states.

Instead of the current system which tends to support rather small eligible areas, which are unable to support a wider spatial perspective, Funds should be allocated in a competitive way with no constraints other than that of maximizing the added value of the investment. An assessment of the urban system may facilitate a spatially sensitive delimitation as well as identifying most profitable activity. It would also involve strengthening the endogenous potential of FUAs which have potential of European or global importance (through a particular economic specialism or cultural peak-competence or targeting potential areas of functional specialisation), to strengthen their position globally. This could be helped by more sector co-ordination. It is advocated that promoting strategic alliances between FUAs can further bolster these objectives.

Clearly, this omits regions which are less competitive. For such areas it is suggested that Structural Fund monies be used to build up R&D, tourism, re-structuring or other potential strengths. Alternatively where weakness is due to 'permanent handicaps of remote or sparsely populated regions' it is recommended that 'non-region based clusters' are engaged.

Implications for competitiveness

Relating to the Lisbon strategy then, it is argued that to become more competitive and dynamic potentials and comparative advantages of urban poles with the most realisable development potential should be identified as 'engines for improving competitiveness and dynamism'. The objectives of international economic competitiveness are thus being explicitly linked to the idea of polycentricity, with a recommended emphasis 'more a focus on the effective use of limited resources through a focus on governance effects' than, it is implied, the use of substantial resources in a 'remedial and ineffectual way'.

5.4.6 Pre-accession aid (2.2.2)

The project on the territorial effects of 'acquis communitaire' for pre-accession aid and the Phare/Tacis/Meda programs begins by reviewing the aid and its focus to date. While half of this has concentrated on environmental projects, the remainder focuses on improving competitive regional structures mainly through investments in transport infrastructure.

Recommendations and scenarios

Recommendations from the project stress that future assistance must support regions capable of acting as growth poles for national and EU economies (including second and third rank cities within them) and eliminating barriers to future competitiveness. This 'potential oriented approach' projects that growth is most likely to achieved in regions already well endowed with potential and that this growth should then have a snowball effect on neighbouring regions. It stresses the creation of growth from economic centres through competition oriented policy. It is argued that without strengthening these regions for European competition in terms of their human resources and innovation capacity, all regions in new member states and candidate countries will fall back in relation to the Lisbon Strategy.

This concentration on potential, as with project 2.2.1, shows something of a departure from previous remedial type prioritisation aiming for spatial cohesion. However old industrial areas in need of restructuring and peripheral rural areas are recommended alternate packages based on environmental improvements and the building up of local SMEs and other forms of institutional capacity building. But they conclude that funding should, 'avoid jeopardising national efficiency by channelling resources to regions that have little prospect of competing, while retaining some policy orientation towards indigenous development in less-favoured areas'.

The project's analysis is supported by their categorisation of area types according to average growth and intervention levels, as high intervention levels are shown to have no correlation with growth levels. The implication is that in differentiating between varying priorities of the new Structural Fund policy interventions, spatial delineation between countries and regions with and potential is preferable to a priority mindset.

5.4.7 Effects of Structural Funds in Urban Areas (2.2.3)

Recommendations

The potential role of FUAs in the Lisbon strategy is also central to this project, which has given attention to what makes cities compete successfully on the international stage and produces some relevant recommendations for the future allocation of Structural Funds. The success of cities, it is demonstrated, should not just be about meeting the needs of business as, 'economic structures are not tied to competitiveness. Competitive cities can successfully sustain thriving industries in declining sectors whilst expanding sectors may grow sub-optimally in non-competitive cities'.

Former Structural Fund concentration on 'declining urban areas' have failed to deal the root causes of the decline. As with some of the other TPGs, 2.2.3 project partners argue that the better strategy (at least economically) would be to focus on the potential competitiveness of urban areas. Thus, they recommend that for the 2007-2013 Structural Fund period:

- A increased urban focus is adopted (with the above provisos)

- A new EU-level approach is used which will significantly widen eligibility for support, with potentially 100% of urban areas being able to apply for an element of the new Funds.

5.5 Current projects

5.5.1 Spatial Scenarios (3.2)

One of the tasks of this project is to reassess the indices and measures used in the construction of a European Territorial Cohesion Index (ETCI). Early work on this has led to indications that respecting the principles of the Lisbon Agenda may imply a shift from the agreed objectives of the ESDP. Thus two different formulas were proposed in experimentation for the ETCI. The first, classed as 'ESDP oriented', was based on the three goals of the European Spatial Development Perspective; economic competitiveness, social cohesion and sustainable development. The second, 'Lisbon oriented' stresses the future competitiveness of Europe as being associated less with cohesion and sustainability, than post industrial activities and human capital as measured in indicators such as education levels[26].

The implications are uncertain. One of the most problematic issues is the relationship between cohesion policy and the Lisbon objectives – does the support of regions lagging behind hinder competitiveness and dynamic growth in Europe? Furthermore, is regionalisation (regional breakdown of Structural Funds) one of the principal causes of the underutilisation of funds and their low efficiency? In summary, must Lisbon necessitate a move away from cohesion as main goal – and are the agendas of Lisbon and the sustainability interests of Gothenburg compatible?

Preliminary scenario work (still in draft form) addresses some of these issues by investigating the key problems accounting for a poor EU competitive position relative to the USA, and then providing four *prospective policy*[27] scenarios;

- High efficiency/competitiveness — low equity/cohesion (best foot)
- High efficiency/competitiveness — high equity/cohesion (Euro Tigers)
- Low efficiency/competitiveness — low equity/cohesion (Balnibarbi)
- Low efficiency/competitiveness — high equity/cohesion (Beaten track)

The initial conclusions from the 'Euro Tigers' scenario is outlined in the appendix below. This scenario most closely reflects the findings and perspective of the ESPON work as summarised above.

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[26] Work for the Second Interim Report includes the development of scenarios covering aspects of economic competitiveness and issues relating to sustainability up to 2030. At present these are in draft form, but will be available for analysis later in the project.
[27] Prospective policy scenarios consider the impacts of policy changes, in this context in key national and community priorities.

5.5.2 Conclusion

The implications of the review of the work and conclusions of the ESPON projects to date are, if accepted, substantial. They suggest a need to move away from previous trajectories about competitiveness in particular. The most notable change, though linked to a policy approach, is a spatial repositioning, away from an association of competitiveness with the capabilities with capital cities towards a broadening of the economic base and an explicit promotion of polycentricity. The inference is that this will not only ultimately have economic benefits, but will have advantages in terms of sustainability.

If polycentricity is acceptable as an objective in the fulfilment of the Lisbon and Gothenburg agendas, RDT is most a most appropriate tool as innovations in this sphere do not depend on geographical connectivity. As such, with targeted intervention and investment, future RDT growth could positively impact the spatial structure of the EU territory; stimulating competition away from the Core.

Realistically achieving this 're-growth' in an effective way may mean moving away from a 'remedial' approach to structural problems, to concentrating on future 'hubs with potential'.

Other policy aspects covered by the ESPON work prove more problematic for working simultaneously towards the goals of competitiveness and sustainability. Transportation is particularly challenging, the focus of conflict being related to fuel consumption. Compromises here were found primarily in the desirability of modal shifts. Similarly with energy policy, diversification was promoted as the way forward.

The issue of the changing demographic composition of the EU proved especially resistant to practical recommendations, particularly in terms of the realisation of the Lisbon agenda. This is an area of that needs more exploration as regards the implications of current population projections on economic competitiveness, environmental sustainability and future spatial development.

Implications which arise more broadly from all projects relate to the identification of regional variation, denoted by area type and geographical area, which impacts capacity to develop competitive potential. This aspect of work can feed most directly into future regional level policy recommendations.

The review above reflects the fact that previous ESPON projects have not considered sustainability and competitiveness concurrently, or their implications for each other. Indeed some project conclusions infer that they are incompatible; however work in this project will attempt to unite the concepts through the development of the notion of competitiveness in sustainability and re-evaluate policy sectors in this context.

5.6 Future direction of work on policy reccomendations and scenarios

Policy recommendations will be developed in an integrated or cross-sectoral way and in their development we will continue to work closely with the other projects in the third ESPON strand, in particular project 3.2 (Scenarios). Concentration in other work packages will continue the study of other ESPON projects in identifying uneven and unequal development, areas in particular need for support in the context of the reform of the structural funds post enlargement and the identification of barriers to future potential polycentric development. This work will inform our policy recommendations which, though focused initially on the EU level, will include specific measures appropriate for lower levels of governance in line with our approach to competitiveness in sustainability.

6 Considerations on Policy Recommendations

A methodological comparison among the issues concerning the several ESPON projects/programmes in order to point out any disparity connected with **Policy Recommendations** also implies a preliminary look at what had already been proposed – in the form of "suggestions" – within the ESDP policy and, through this, also achieved.

The ESDP policy on the territory is marked by a very careful approach to the problems resulting from any possible disparities between one issue or one other, according to a global vision that considers the Community territory a one-off reality, despite the fundamental differences between one country and the other or one field and the other. Nevertheless, these very differences paint a comprehensive picture, however varied it can be, of any possible problems. They also set a series of questions that cannot be easily solved. The ESDP policy has resorted to the use of "suggestions", in order to be deliberately prudent through recommendations that were not binding, that were not meant as impositions, but that played the role of *several possibilities* one could appeal to, thus choosing the ones that best suited the territorial reality taken into consideration.

They are therefore matrices with multiple components, each of which is marked by its own interpretative story. This means that each component has been examined in an integrated way and then compared with the others so that it does not prove detrimental to or inconsistent with the general framework. Each component, however, is independent and, at the same time, possesses a more or less wide range of application possibilities. It is up to the policy-makers, academics and researchers to gradually find out the best solutions to the cases of real application on the territory. This kind of policy, although only partially deliberately expressed within the ESDP programme, is very reliable in terms of experiments and applications and it also greatly reduces any possible risk of inconsistency, intolerance, inadequacy and disparities between one sector and the other.

Then much is justly delegated to the skills of the administrator and of his/her scientific aides, to their ability to assess and rightly pinpoint the indications for a real application.

On the other hand a different way of harmonising the suggestions could not be conceived, and this is even more true today with an enlarged Europe and with the membership of countries with remarkable differences, above all in their policies and institutions, besides geomorphologies, climates and organizational methods.

Nor does a similar approach cause a lack of organization: the utopia of an integrated Europe despite its own varied aspects will always be a utopia. And it should remain a utopia. Every territory should possess and maintain its own peculiarities, yet respectful of the other's differences. On the contrary, it is just these peculiarities that mark out and define Europe as a whole. The attempt to outline a single territorial policy is also utopian. Every experimentation in this respect would be destructive and dangerous. The awareness of the disparities is the key to a real and constructive policy.

This, obviously, does not mean not tending to a common management of the several aspects; but the limits that a hypothetical management may give rise to is to be carefully examined. Take a paradoxical example; what may the policy for the coastal areas, which is so well outlined within the ESDP programme, mean to those countries that do not have any? Take also a less paradoxical but more general example: which common policy may be applied to the field of transports among highly technologically developed countries and the still developing ones today, given the present disparities in the several territorial and administrative realities?

The current objective, as already mentioned, is to "lean towards a common policy", to "tend to a common policy" thus moving away from the presumption in wanting to "carry out" a common policy today.

For this reason, before examining any possible inconsistency, some basic elements and foundations that underpin the targeted analysis must be provided:

1. Respect for diversities: administrative/institutional, geomorphologic/environmental/climatic, social/religious and also those connected with the juridical and economic level of the several countries;

2. The awareness that these very diversities embody, at times, the basic elements for Europe as a whole: geographical, climatic, environmental, religious and even political diversities cannot but represent important values in the age of globalization. These differences must be preserved, still from the point of view of the development of the different parts and must adopt targeted sectional policies;

3. The awareness, on the other hand, of some worrying diversities that may constitute a hindrance: social, economic, infrastructural and, sometimes, institutional differences can undermine the Community growth. It is therefore necessary to aim at the equalization of the common territory over time.

The task is also hard in the field of non-effective diversities and of the resolution of such diversities; these disparities may not always be valid for each country.

The three great spheres of the “economic efficiency”, “territorial equity” and “environmental sustainability” require a different specific approach to any relevant issue (transport, urban management, rural areas, et cetera) according each single country, each single reality and each more or less wide territorial field. Such disparities are often apparent also at lower levels, such as the regional and, at times, the local ones. And it is quite difficult to put forward considerations that can be useful to a national scale.

One cannot therefore but consider what is stated above. And, similarly, for honesty’s sake, the utopia of an ideal common policy cannot be supported. Actually, two macro issues are clear and emerge and must always be taken into consideration: “diversity” and the “limited possibility of tending to a common territorial policy”.

Each single action, on the long-term, must aim at bridging the gap that today exists among the European countries. And again, each action must aim at granting the maximum respect for the structural diversities that cannot be overcome.

This is the only way (and within this dimension) by which debates like “efficiency against equity” and “territorial equity against environmental sustainability” play a non-rhetorical but, on the contrary, a productive role. And, probably, following the change in the principle of equity itself, also the very terms of reference change.

Productivity should be searched in relationships such as “common efficiency within diversities” and “common environmental sustainability within the territorial diversities”.

This is a scenario that transforms the terms of many analyses applied to the territorial realities: the analysis that compares the costs and the advantages, for instance, in the field of services for the urban transport or in the field of the administration of rural areas, or again in the wide and transversal field of the ICT, in the one of the natural risks and, even more so, in that of the cultural heritage.

The key to a successful ESPON programme lies in the assimilation of these components of diversities and in the humility of proposing hypothetical solutions, mainly on the long-term.

For this reason a further explanation for the stages of the ESPON actions – hereinafter referred to as “suggestions” – is necessary:

- **in the short-term**: such suggestions should include all those actions that, although they aim at a common Europe, are faced with the present great differences; these are the actions that only partially include (or do not include at all) the idea of common policy;
- **in the medium-term**: all those actions for which a possible reduction in time differences is foreseen. They include, for instance structural diversities, for which a subjective policy, strictly connected with the territory it refers to and whose key is the very diversity, cannot be applied;

- **in the long-term**: all those actions for which a common policy is possible and for which univocal solutions may exist and Policy Recommendations summarizing the present diversities in order to reach the only possible equity.

The great disparity that can be seen, if it really is a disparity (or rather the great difference between objectives and players) is in tune with the approaches to the ESPON issue with its different forms. The **Policy Recommendations** are not always clear or clearly stated in the several contributions. This is probably due to the basic problem of conceiving methodological parameters common to the whole European territory and valid for any direction of study. The introduction of a method able to get and list the problems connected with diversity, as mentioned above, could help provide more recognizable elements and expose the objectives of the programme.

The challenge of a common intervention policy, then, on one hand reduces its range of action and on the other makes it wider and harder.

In the field of territorial competitiveness, for example, the challenge does not lie in finding common policies, on the short-term at least, but in identifying the possible and more practical common parameters for the competitiveness of a territory, and – also through these, which result in indicators – in creating a framework of objectives, partially common and partially referred to the disparities.

To this purpose one should consider the different territorial dimensions, traditions, procedural institutional classes within the framework of policies aiming at reinforcing the general reference policy, since the increasingly closer cooperation among the countries, on the long-term, certainly bridges the present gap in several fields. The complicated issues of partnerships among EU countries and among them and the rest of the world as the subject of the improvement of the policies integrated into the planning of structural funds are parts of good-governance elements that does not consider the identification of the barriers but the existing opportunities among the different territorial realities.

The subject of the urban areas includes many aspects and is therefore dangerous.

The territorial development through polycentrism has already been dealt with in the ESDP: the areas of global integration, frontier cities, more or less big urban areas, attraction poles, etcetera.

6.1 A particular raccomandation looking at EU Economic Scenario (Euro Tigers)

This scenario describes a situation where the EU pursues a strong two-pronged strategy of economic competitiveness and territorial cohesion. This is currently articulated in the Lisbon/Gothenburg strategy that aims at competitiveness, cohesion and sustainable development and thus echoes the principles stated in the ESDP. The concept of polycentricity is used as a vehicle to achieve implementation.

Scenario hypothesis

In this scenario, the EU embarks on a mission to implement the Lisbon/Gothenburg strategy. While large enterprises and advanced regions will adapt to the new requirements based on (own and external) private resources, knowledge-based and innovative development of small and medium-sized firms and of more peripheral regions will need to be supported by EU and national policies. It assumes also that a more differentiated approach will need to be applied to countries and regions that are in quite different situations. According to the EuroTigers strategy, support is given to areas with the potential to become competitive on a global scale. Consequently, new competitive knowledge and innovation centres will emerge both inside and outside of the “Pentagon” and not within, but around large urban centres. The EU and cohesion policy will play a more active role in these developments than previously. The most lagging regions are largely "written off" as having little promise for improving the EU's competitiveness. Like the other scenarios, it is assumed that current globalisation trends will continue as well as the rise of the knowledge economy. It furthermore assumes that external conditions will be favourable, or at least non unfavourable, and enabling to implement the reform of the EU.

Driving forces

The main driving forces of this scenario are the ambitions of the Lisbon/Gothenburg strategy and the midterm review, European enlargement, globalisation and increasing pressure from international competitors in the knowledge economy. These will be considered in turn.

- *Critical reports:* Lisbon/Gothenburg remain the best statement of European ambitions behind which most member states and citizens can rally. The midterm reviews only emphasise the fact that more efforts — not less — are needed at the European scale. This is consistent with the ESDP and many ESPON findings. In addition, insights into the knowledge economy show that 'softer' criteria are also vital in securing a region's competitiveness, an argument for retain the aspects of cohesion and sustainability in the Lisbon agenda.
- *Enlargement:* there is a formidable task of reforming sectoral policy in a fair way to accommodate the new member states and bring them up to speed with the rest of Europe. It is acknowledged that the low starting point in terms of GDP per capita can translate itself into high annual growth, and thus interesting to investors.
- *Globalisation:* the mediocre economic performance of Europe in terms of annual growth could be augmented with the incorporation of developing regions (Euro- Tigers) gained by the enlargement into the EU.

- *Governance*: economic organisations (enterprises) will apply business strategies suitable to enhance competitiveness and innovation. Governments and politicians of member states, inspired by their responsibility for the future of Europe, will implement those changes in the institutions, lows and regulations at national and supranational level which are necessary to set the European economy on a new development path, without losing the specific European achievements and social traditions.

Contextual elements of the EuroTiger strategy

With the subsequent enlargements the European Union became more heterogeneous. Heterogeneity poses, without doubt, a threat to community governance, but simultaneously it is an opportunity as well. The European Union has to apply a more differentiated approach to countries and regions being in very different situations and at rather different development level. A differentiated approach is not necessarily contradictory to integration and can, in specific situations, even facilitate and promote integration. In addition, although the new member states are lagging economically, for precisely this reason they have great growth potential, which far exceeds that of the elite areas in Europe in proportional terms. This is the essence of the EuroTigers philosophy. The new member states of the Union offer a suitable ground for experiments with new policies and new methods of government. This has already been realised by the European Commission. For example, the European Union applied a 50:50 share between Guarantee and Guidance sections immediately after accession. This proportion will bring about a much more rapid structural change in rural areas than what we could observe in the old member states. There are many ways to restructure European agricultural, social, R&D, cohesion and structural funds in order to promote stronger structural change and growth. These changes can be applied first in the new member states, and if they work well there, they can be extended to the whole territory of the EU.

The economies of the new member states — and those of the “old” cohesion countries as well — are now growing faster than the EU average. Obviously, their economic weight is not sufficient to give a momentum to the overall growth of the EU, nevertheless, theirs can be a valuable contribution to the dynamics and to the more balanced spatial structure of the EU beyond their proper weight, if managed properly. That is one of the main elements of this scenario.

The midterm review of the Lisbon/Gothenburg strategy provides a new impetus for change within Europe. The sobering conclusions serve as a call for action to implement the strategy in its full form: competitiveness, cohesion and sustainability. This becomes a rallying call for all member states; rather than accept a Europe of two speeds all member states must band together to ensure that Lisbon becomes a reality. In order to raise the political support necessary in an enlarged Europe, the strategy devised to unite old and new member states stresses the complementarity of competitiveness and cohesion. Ireland is held up as a ‘EuroTiger’, a shining example of successful use of structural funds, and a model for the N10. Its progressive stance on intra-EU migration is also praised.

The ‘EuroTiger’ strategy

The essence of the Tiger strategy is to identify specific areas and sectors that hold the most promise for rapid and sustainable economic development. But these are not necessarily the elite. Proponents of the EuroTiger strategy see devoting resources solely to the performing areas as flawed for three reasons. First, they already have such formidable resources that any extra support provided by the EU would be very small in proportional terms. Second, since these top-performers are already successful (by definition), they most likely have the resources to remain competitive without EU assistance. Third, since most of these institutions and regions are located in relatively wealthy member states anyway, if support were needed, this could be granted at the national level. The EuroTiger strategy, in contrast, seeks out instances where it can make a decisive contribution. The philosophy is similar to that of regional policy where funds are only given as a critical extra push for a project, rather than comprising a significant share of the total costs.

Like in spatial development, the motto is that polycentricity constitutes the golden mean between equity/welfare and efficiency/redistribution. This has the clear advantage of broadening the base of political support for the strategy, seen as a prerequisite for the implementation of the Lisbon strategy (COM(2005)24, p. 12). The experience of the last years seems to confirm the viability of this strategy. Not just the new member states, but practically all capital regions have increased their relative level of development (compared to EU average) in the Northern, Southern and Eastern periphery: Stockholm, Helsinki, Budapest, Bucharest and Warsaw with more than 10 percentage points. Beside capital regions, there are a few other regions outside the Pentagon which can fulfil the growth pole function. This means that without these regions the "catching-up" process in these countries could not take place, these regions and cities are actually the "carriers of growth" in the relevant areas. It is a fact that cannot be disregarded. It is assumed in this scenario that EU policy will build upon this process as a very important factor of European cohesion policy and, simultaneously, factor of European growth and competitiveness. Additionally, this development process will largely contribute to a more polycentric structure of European space and urban network.

Implementation of the strategy

This section complements the ESPON conclusions, see 2-4 above. A short summary of the various interventions into strategic decisions and sectoral policies that are required to realise the strategy outlined above is provided.

- *Agriculture:* CAP in its present form is not viewed as supporting the EuroTiger strategy because it tends to work against cohesion and supports an old industry. There is little economic reason for maintaining the current level of European exports of agricultural products, made inexpensive by lavish Pillar 1 subsidies. However, Pillar 2 does seem to hold some promise for maintaining the environmental quality of rural areas.
- *Competition:* internal market rules (including public procurement) must be rigorously applied as the development of new markets necessitates unobstructed flow of capital and labour. Markets must not be distorted with national state aid (usually to failing industry), but instead aid must be given at a EU level with the goal of acting as a catalyst to allow exciting new businesses to gain their footing.
- *Enlargement:* this is a dynamic process in this scenario. Nevertheless, this process is not exclusively guided by market expansion and political control considerations, as in the first scenario. The deepening of integration is as important aspect of the process as widening of the EU. Therefore, the enlargement process is subject to reasonable limits, set by political, social and economic absorption capacity. The present candidate countries (Bulgaria, Romania, Croatia and perhaps Turkey) will join the community but further enlargement is not to be expected within the time horizon of the scenario. The policy approach toward individual member states or groups of member states will be differentiated to reflect the different potentials of member states.
- *Environment and nature:* value for a clean environment and natural heritage is seen as an asset of Europe, rather than a liability, which sets it apart from its major competitors. Natura2000 should be implemented throughout Europe and environmental standards applied firmly because all of Europe's citizens have the right to clean air and water. Economic development does not have to come at the cost of the natural environment.

- *R&D:* To meet the Lisbon objective of 3% of GDP, the budget for research will need to be increased dramatically. With regard to the Framework Programme, an evaluation of FP6 showed that it was 'almost impossible' for SMEs to participate in the 'Networks of Excellence' programme and that it was particularly difficult for newcomers to become partners (High Level Group chaired by Ramon Marimon, *Evaluation of FP6*, 21 June 2004). In EuroTigers, this problem is remedied with specific measures to ensure that new and smaller organisation also reap the benefits of EU R&D policy. Avoiding uneasy compromises, the principle of scientific excellence is consequently used as the core criterion for decision-making within the framework of European R&D funding. However, instead of taking for granted a ruthless competition for scarce financial means, European policies (in coordination with national policies) follow a strategy to encourage researchers and small businesses in less favoured regions to participate in innovation processes either funded by public means or by private resources. Such policy actions to strengthen development cores in disadvantaged areas are accompanied by initiatives to improve the mobility and the skills of the workforce, e. g. by improving the accessibility of the emerging development cores and by offering training measures. Spatially concentrated efforts to improve the quality of living in these cores will lead to a growing attractiveness of these locations for young, well educated people (whereby, however, the attractiveness of the agglomerated spaces in the core of Europe remains greater. Large companies possess and use the capability to manage these training requirements themselves whereas small firms benefit from public support, e. g. from initiatives to create "learning regions", based on private-public partnerships.
- *Regional policy:* the tenets of the policy proposed in the *Third Cohesion Report* (2004) are largely consistent with the EuroTiger strategy, insofar that both competitiveness and cohesion are

objectives. However, EuroTiger goes further in linking the two, taking full heed of the recommendation of ESPON 2.1.2 to facilitate coordinated implementation of regional and R&D policy. The same report has shown that R&D investments in less developed regions may deliver more value-for- money as the impact on accelerating the 'catching up process' is greater.

- *Transport:* as the EuroTiger strategy rests on the idea of polycentricity, this will become the Leitmotiv of the EU's transport policy as well. For the most part, this corresponds with initiatives already underway: the linkage of major 'peripheral' centres with the core of Europe with high-speed connections. However, a budgetary increase is necessary to translate EU-scale priorities into concrete results.

Impacts

Since the ambition is to enter the economy scenarios in the MASST model, only certain qualitative and rather guarded statements can be made here regarding *expected* results. These will have to be borne out later by the quantitative results. Below the aggregate and territorial economic impacts, rather than the predicted spatial consequences, are given.

- *Aggregate economic impact:* In a report to the European Commission *Delivering Lisbon*, the authors state that "studies and simulations, conducted by the Commission, have concluded that the simultaneous and integrated pursuit of reforms [akin to the EuroTigers strategy] will produce an increase in the GDP growth potential of the Union in the order of 0.5-0.75 percentage points over the next 5 to 10 years" (COM (2004) 29 final/2, p.2).

- *Territorial economic impacts:* Territorial cohesion in Europe would decrease at the national level as more competitive regions seize new opportunities, and are actually stimulated in doing this by the EuroTiger adapted structural funds. Territorial cohesion would however increase at the macro (European) level as secondary regions acting as carriers of growth — like Prague, Budapest and Warsaw — catch up to and in some respects even overtake regions in the Pentagon.

At the meso level, disparities within these countries will increase (as it has been experienced in the last one and half decade), since the large part of national GDP increment will be born by these leading regions. These increasing disparities can be regarded as of transitional, provisional character. Filtering down and "spread" and "pull" effects sooner or later will have their impact upon the growth of the other regions of the respective countries, though this internal catching up process might prove to be of rather long run character. Nevertheless, within countries there is always a budgetary redistribution process, so that poorer regions are beneficiaries of higher income generation in the growth poles even in the short run.

Summary and conclusions

This scenario visualises the implementation of the Lisbon strategy as it was formulated in 2004, with reference to cohesion and sustainability. There is an obvious link to be made between these economic ambitions and the three-pronged strategy of the ESDP. For this reason, the concept of polycentricity is also well adapted to the EuroTigers strategy. The outcome of the scenario is [although the MAAST model has to confirm this] slightly higher total GDP growth than the 'best foot forward' scenario and considerably higher growth than the next two scenarios. This is because of improved effectiveness of stimuli. The effect on territorial cohesion will also differ from the previous scenario. Here, it is expected to increase at the macro level (rather than decrease) but decrease at the meso level.

7. Linkages with other ESPON projects

During these months the 3.3 project Lead Partner had deep and continuous contacts with the lead partner of 3.2 project (University of Bruxelles) and its partner in Italy (University of Milan). At present, the exchanges have been mainly informative because the 3.3 project has started after the 3.2 and at present no overlapping outcomes of the two projects are envisaged. On the contrary, overlapping activities in data collection exist, and coordination activity has been put in place. Particularly, an intensive exchanges of information about definitions is in course with the Lead Partner of 2.3.2 project (University of Valencia)

European Spatial Planning Observation Network

ESPON Project nr. 3.3

Territorial dimension of the Lisbon-Gothenburg strategy

SIR ANNEX
The definition of Determinants' calculation

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This Annex contains the first empirical evaluation of the selected indicators, based on the literature review and, less predominantly, on data availability.

A critical review is in progress within the TPG; nevertheless, we consider it useful to present this detailed breakdown of the determinants through the indicators, although it will surely undergo major changes.

A1. INNOVATION & RESEARCH

Determinants	Typologies	Sectors	Categories	Indicators
Innovation & Research	Knowledge and Information Society	"virtual" society	Population	n° internet users, population with tertiary education, n° pop. e-learning
			Institutions	n° municipalities with e-government, ICT expenditure, GDP pro capita
			Firms	n° firms with internet access, n° firms wiht own web-site, n° firms e-commerce
		Knowledge creation facilities (cfr. ESPON 2.1.2 thematic maps)	R&D	public R&D expenditures and business R&D expenditures as a percentage of GDP per capita
			R&D infrastructures	Science Parks that are members of the International Association of Science Parks (ISAP), n° Business Innovation Centres, Most Actively Publishing Universities and Public Research Institutes
	Technological equipment (cfr. Espon 1.2.2 thematic maps)	Old technologies		n° fixed lines/households, n° mobile/pop, n° housholds with TV
		New technologies		n° PCs/pop, n° broadband subscribers/pop, n° internet servers/sup
	Innovative Human Resources	Human capital (structure)		dependency index, youth index
		Innovative Human capital (education)		population with tertiary education, population in life-long learning, public expenditure for education, science and technology graduates, early school leavers

Key element in the field of firm competitiveness, the innovation & research area is today a capital point in the territorial competitiveness dynamics.
It could be seen as a Schumpeterian process with three moments, not strictly delimited in several cases: **Knowledge and Information Society**, **Technological Equipment** and **Innovative Human Resources**.
The model of innovation suggested implies that not only one direction of innovation creation exists but there are many forms that require more importance to relationship grade between agents besides their ability to capture information and knowledge.
This articulation between agents, and between agents and institutions, becomes an important element to create dynamic competitive advantages, in the formation, transmission and evolution of innovation. This implies that the essential support of this area is the available knowledge for the various territorial actors, the entrepreneurial environment and the productive framework where they insert and act.
Thus, the specific location becomes a knowledge generator.
Overcoming the various and sectorial definitions of the innovation, the Information and Communications Technology (ICT) can be seen as the contemporary and cross-border expression of the innovation & research field.
The Information and Communication Technologies are generating a new cultural revolution, as important and driving as those of the past centuries. It's a revolution based on the information, that is expression of the human knowledge. Technological progress today allow to elaborate, store, find and communicate information regardless their format (oral, written or audio-visual) without distance, time and volume limits. It's a revolutions that allows to the collectivity to gain new capacities.
The fast development of the Information and Communication Technology (ICT) has brought about deep changes in our way of working and living, as the widespread diffusion of ICT is accompanied by organisational, commercial, social and legal innovations (Mundula, 2004).

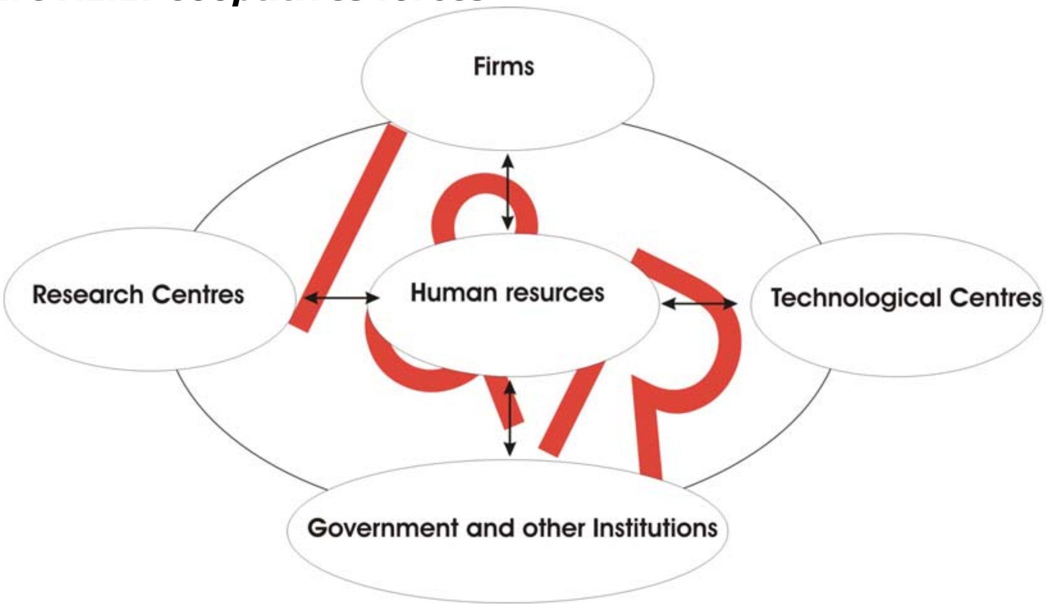
According with this framework , from an operative point of view Innovation & Research (IR) is a function of Knowledge and Information Society (KIS), Innovative Human Capital (IHC) and Technological equipment (TE).
To obtain the Innovation & Research value now we have to combine the different components using the distance from an optimal value, so that we'll have

$$IR=\sqrt{KIS^2+(1-HC)^2+(1-TE)^2}$$

A1.1. Knowledge and Information Society (KIS)

Our society is now defined as the "Information Society", a society in which low-cost information and ICT are in general use, or as the "Knowledge(-based) Society", to stress the fact that the most valuable asset is investment in intangible, human and social capital and that the key factors are knowledge and creativity. This new society, that we can call Knowledge and Information Society, presents great opportunities: it can mean new employment possibilities, more fulfilling jobs, new tools for education and training, easier access to public services, increased inclusion of disadvantaged people or regions.
These trends highlight new strategies of competitive development of regions that have their centre of interest in the creation of networks of innovators, where institutions, companies and societies related by knowledge influence. In that context, dynamic flows are characterized by their cooperative character as far as the contribution of knowledge. This would constitute a new frame of analysis in the style of the competitive forces of Porter, that in an extended rivalry scheme allow the regions to obtain a favourable or unfavourable result. In the new frame of analysis the forces are cooperative internally to obtain greater competitiveness externally, which can be denominated cooperative-competitive or cooptitives forces (Fig. A1.1).

Figure A1.1: Cooptitives forces



In this scheme of analysis two main characteristics can be emphasized. In the first place the relationships set between Firms, Population and Institutions is moreover oriented towards new technologies' use as much as could be called virtual society.

A second characteristic of the scheme enunciated in Figure A1.1 is that those relations, when correctly oriented, lead to a knowledge creation that is often related with research centres as Universities, Science Park, Business Innovation Centres (BIC) and so on.

In order to measure the Knowledge and Information Society (KIS) it is therefore necessary to find a value for the two different sectors: virtual society (VS) and knowledge creation (Kc) and then join them in a synthetic indicator (typology).

It's to be noticed that in this case we are combining distances from an optimal value so that the optimal solution is that of minimum distance (ideally, zero).

$$KIS = \sqrt{Kc^2 + VS^2}$$

A1.1.1. Virtual Society (VS)

Definition

A society is virtual as much as its various components (population, firms, institutions) use new ITC technologies (such as Internet).

It's necessary to study in depth each category and finally join the results

Virtual society (VS) = f [virtual firms (VF), virtual population (VP), virtual institutions (VI)]

To find a relationship among VF, VP and VI we can use the approach of the optimal vector.

$$VS = \sqrt{(1-VF)^2 + (1-VP)^2 + (1-VI)^2}$$

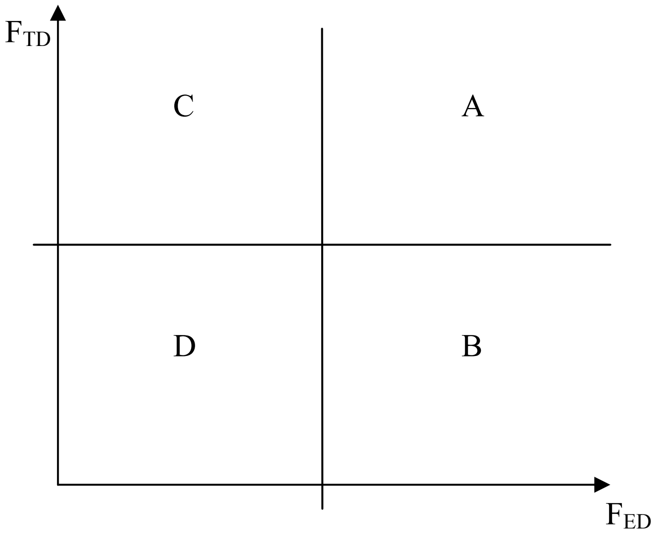
A1.1.1.1. Virtual Firms (VF)

<u>*First step: description of the entrepreneurial background*</u>

The entrepreneurial background (FB) is function of Firm Territorial Density (F_{TD}) and Firm's employees Density (F_{ED}):

$$\left.\begin{array}{l} \dfrac{n°\ firms\ \ (total)}{territorial\ \ area} \Rightarrow Firms\ \ Territorial\ \ Density\ \ (F_{TD}) \\[2em] \dfrac{n°\ firms'\ \ employees\ \ (total)}{active\ \ population} \Rightarrow Firms'\ \ Employees\ \ Density\ \ (F_{ED}) \end{array}\right\} \textbf{FB}$$

To classify the value of FB we have to combine them using the following diagram:



Where

A = high territorial entrepreuneural attitude

B = medium-high territorial entrepreuneural attitude

C = medium-low territorial entrepreuneural attitude

D = low territorial entrepreuneural attitude

Second step: definition of the Firm Level of Use (FLU)

To define the Firm Level of Use of new technologies (FLU) are useful the following indicators:

n° firms accessing to Internet (F_I)

n° firms with own WebSite (F_W)

n° firms with e-commerce activity (F_E)

looking at the relationships among the latter ones it should be noticed that in quantitative term the situation is as shown in Figure A1.2:

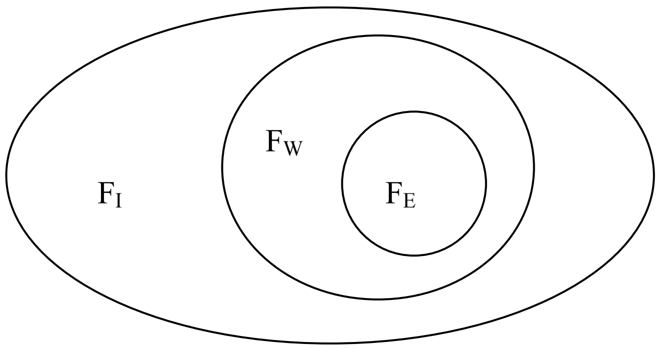


Figure A1.2

That is to say, the firms involved in e-commerce surely have a own web-site and if they have a own web-site they can access to Internet.
In qualitative terms the relationship is opposite, because the highest FLU value will be related to the firms with e-commerce activity. Exploding the third dimension to stress this relationship, we have:

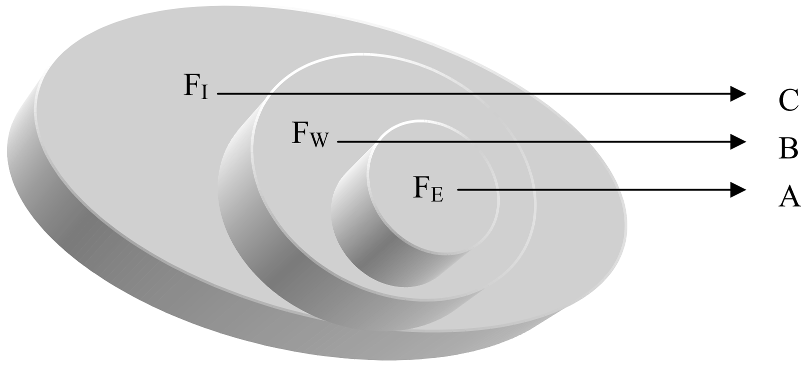


Figure A1.3

The problem is now to find a relationship among these three components or, in other terms, to find the following function:

FLU = f [n° firms accessing to Internet (F_I), n° firms with own Website (F_W), n° firms with e-commerce activity (F_E)]

According to Figure A1.3 let

$x = \frac{F_E}{F_W}$; $y = \frac{F_W}{F_I}$;

and consequentially

$F_E = x F_W$ and $F_W = y F_I \Rightarrow F_E = xy F_I$

in order to stress the potentiality of all the components we define

$$FLU = F_E + F_W + F_I = xy F_I + y F_I + F_I$$

or

$$\boxed{FLU = F_I (1 + xy + y)}$$

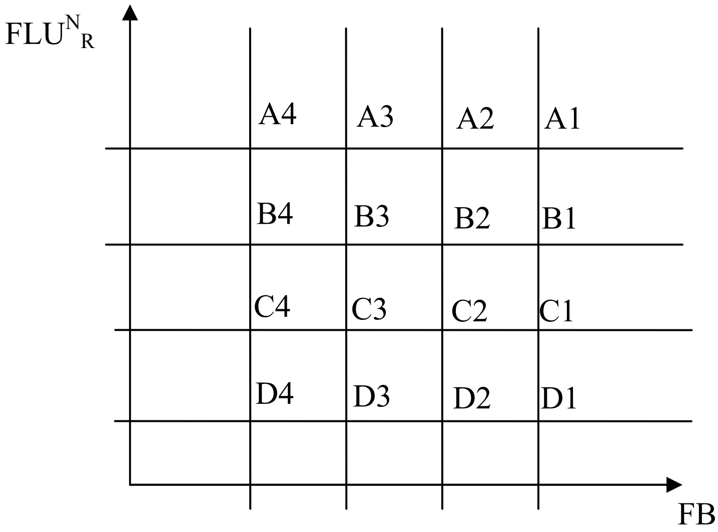
To obtain the relative value we have to divide by the total number of firms (tnF) and normalize this value, so we obtain

$$FLU_R = \frac{F_I}{tnF}(1 + xy + y)$$

$$FLU^{N}{}_{Rj} = \frac{FLU_{Rj}}{\sqrt{\sum_{j=1}^{m} FLU_{Rj}^{2}}}$$

Third step: definition of the Virtual Firms final value (VF)

To define the final value of VF it's necessary to find the relationship between FLU_R and FB. This could be done according to the following matrix/diagram



obtaining a qualitative classification with

A1>A2>…….>B1>B2>…..>D4

A1 =0.90; A2 =0.80; A3 =0.80; A4 =0.75; B1 =0.70; B2 =0.65; B3 =0.60; B4 =0.55; C1 =0.50; C2 =0.45; C3 =0.40; C4 =0.35; D1 =0.30; D2 =0.25; D3 =0.20; D4 =0.15;

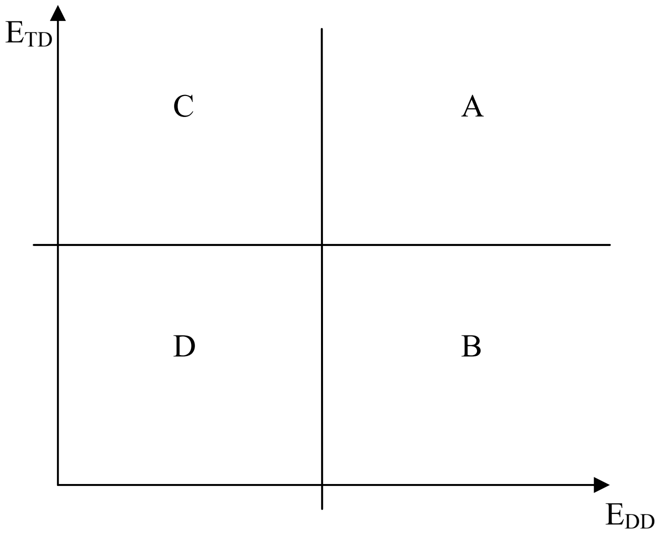
A1.1.1.2. Virtual Population (VP)

First step : description of the educational background

To describe the educational background (EB) that is function of Educational Territorial Density (E_{TD}) and Educational Degree Density (E_{DD}):

$$\left.\begin{array}{l}\dfrac{n°teachers\ until\ secondary\ school\ (total)}{territorial\ area} \Rightarrow Educational\ Territorial\ Density\ (E_{TD}) \\[2em] \dfrac{n°secondary\ education\ attainment\ (total)}{active\ population} \Rightarrow Educational\ Degree\ Density\ (E_{DD})\end{array}\right\}\mathbf{EB}$$

To classify the value of EB we have firstly to use the following diagram:



Where

A = high demand and offer

B = high demand and low offer (concentration)

C = low demand and high offer

D = low demand and offer

Second step: definition of the Population Level of Use (PLU)

To define the Population' Level of Use of new technologies (PLU) the following indicators are used:

- n° population accessing to Internet (P_I)
- n° population with Tertiary education attainment level (P_H)
- n° degree obtained with e-learning (P_E)

Similarly to case of FLU (pag. 8), the population involved in e-learning surely have a Tertiary level of Education and if they have a Tertiary Level of Education they can access to Internet.
In qualitative terms the relationship is opposite, because the highest PLU value will be related to the population with e-learning degree.
The problem is now to find a relationship among these three components or in other terms find the following function:

PLU = f [n° population accessing to Internet (P_I), n° population with High Level of Education (P_H), n° degree with e-learning (P_E)]

Let

$x = \frac{P_E}{P_H}$; $y = \frac{P_H}{P_I}$

and consequentially $P_E = x P_H$ and $P_H = y P_I \Rightarrow P_E = xy P_I$

in order to stress the potentiality of all the components we define

$$\mathrm{PLU} = P_E + P_H + P_I = xy P_I + y P_I + P_I$$

or

$$\boxed{\mathrm{PLU} = P_I (1 + xy + y)}$$

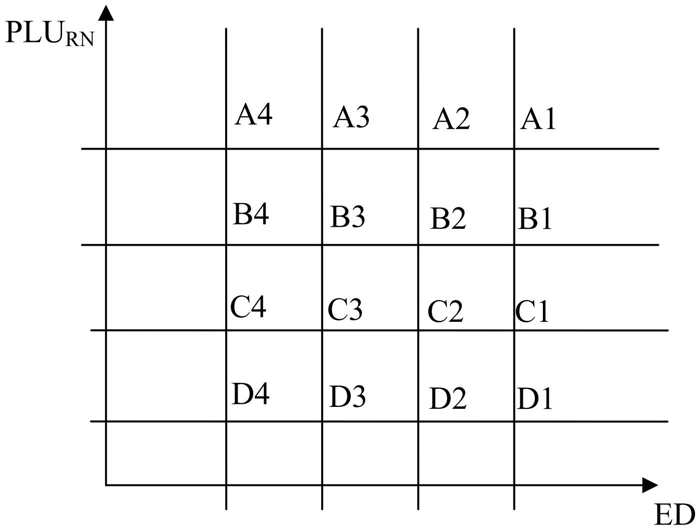
To obtain the relative value we have to divide for the total number of population (tnP) and normalize this value so we have

$\mathrm{PLU}_R = \frac{P_I}{tnP}(1 + xy + y)$ so for the j-th territory analyzed we finally normalize

$$PLU^N{}_{R\,j} = \frac{PLU_{R\,j}}{\sqrt{\sum_{j=1}^{m} PLU_{R\,j}^2}}$$

Third step: definition of the Virtual Population final value (VP)

To define the final value of VP it's necessary to find the relationship between PLU_R and ED. This could be done according the following matrix/diagram



obtaining a qualitative classification with

A1>A2>…….>B1>B2>…..>D4

A1 =0.90; A2 =0.80; A3 =0.80; A4 =0.75; B1 =0.70; B2 =0.65; B3 =0.60; B4 =0.55; C1 =0.50; C2 =0.45; C3 =0.40; C4 =0.35; D1 =0.30; D2 =0.25; D3 =0.20; D4 =0.15;

A1.1.1.3. Virtual Institution (VI)

First step: description of the institutional background:

A fundamental element to be taken into account is that not all the population can access to the "virtual services" as those of e-government; we have then to distinguish two different *potential users*

Share of population accessing to Internet P_I

Share of firms accessing to Internet F_I

so the first indicator will be

$$PU \ (PotentialUsers) = P_I + F_I$$

An other important element is the *expenditure level* on ICT for each territory. So the second indicator will be

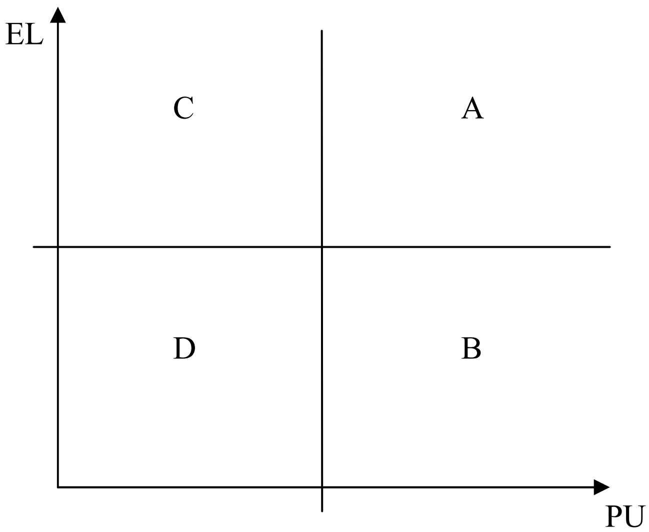
$$Expenditure\ Level\ (EL) = \frac{Expenditure\ in\ ICT(E_{ICT})}{GDP_c}$$

where

E_{ICT} = expenditure in ICT for the territory

GDP_C = GDP pro capita

The relation between EL and PU can be classified using a diagram as the following:



Where

A = high demand and offer

B = high demand and low offer (concentration)

C = low demand and high offer

D = low demand and offer

<u>Second step: definition of the Institution Level of Use (ILU)</u>

To define the Institution' Level of Use of new technologies (ILU) the following indicators are suggested, depending on data availability:

n° municipalities accessing to Internet (I_I)

n° municipalities with own Website (I_W)

n° municipalities with e-government (I_E)

Similarly to case of FLU and PLU (see Figures pg. 8), the municipalities involved in e-government surely have a own Website and if they have a own Website they can access to Internet.

In qualitative terms the relationship is opposite, because the highest ILU value will be related to the municipalities with e-government.

In this stage the above data are not available; therefore, this indicator has been approximated by the e-government on line availability, from EUROSTAT.

The problem is now to find a relationship among these three components or in other terms find the following function:

ILU = f [n° municipalities accessing to Internet (I_I), n° municipalities with own Website (I_W), n° municipalities with e-government (I_E)]

Let

$x = \frac{I_E}{I_H}$; $y = \frac{I_H}{I_I}$

and consequentially

$I_E = x\, I_H$ and $I_H = y\, I_I \Rightarrow I_E = xy\, I_I$

in order to stress the potentiality of all the components we define

$ILU = I_I + I_H + I_E = xy\, I_I + y\, I_I + I_I$

or

$$\boxed{ILU = I_I\left(1 + x + xy\right)}$$

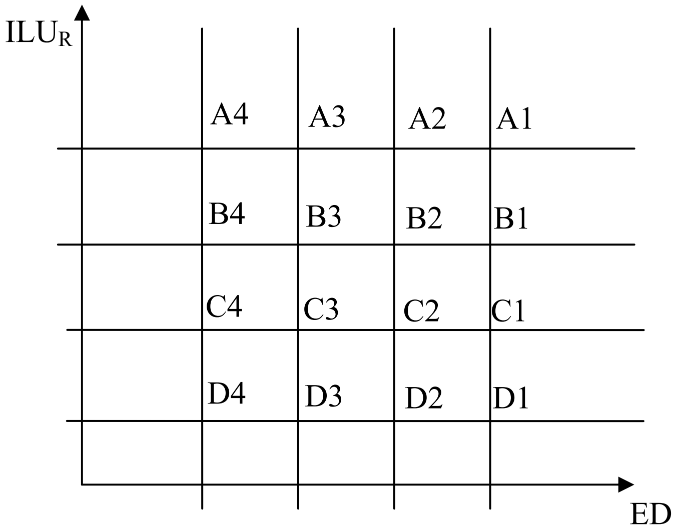
To obtain the relative value we have to divide for the total number of institution (tnI) so we have

$ILU_R = \frac{I_I}{tnI}\left(1 + x + xy\right)$ so for the j-th territory analyzed we finally normalize

$$ILU^N{}_{Rj} = \frac{ILU_{Rj}}{\sqrt{\sum_{j=1}^{m} ILU_{Rj}^2}}$$

<u>Third step: definition of the Virtual Institution final value</u> (VI)

To define the final value of VI it's necessary to find the relationship between ILU_R and ED. This could be done according the following matrix/diagram



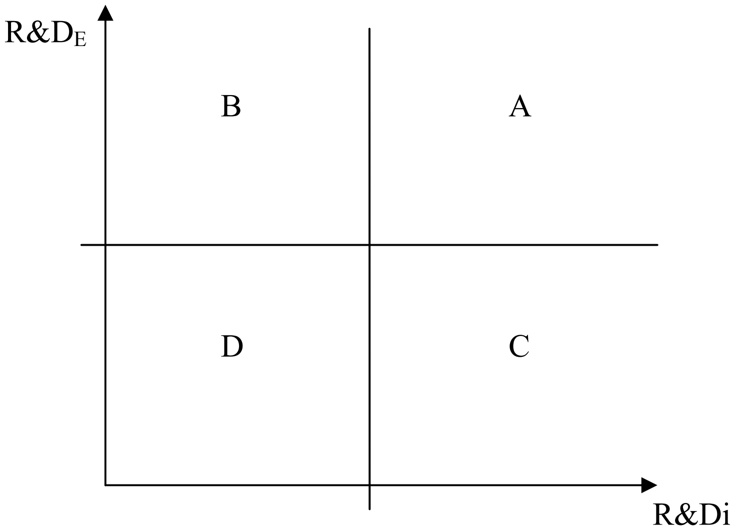
obtaining a qualitative classification with

A1>A2>…….>B1>B2>…..>D4

A1 =0.90; A2 =0.80; A3 =0.80; A4 =0.75; B1 =0.70; B2 =0.65; B3 =0.60; B4 =0.55; C1 =0.50; C2 =0.45; C3 =0.40; C4 =0.35; D1 =0.30; D2 =0.25; D3 =0.20; D4 =0.15;

A1.1.2. Knowledge creation

To find the value of Knowledge creation (Kc) we can use the Espon 2.1.2 results for $R\&D_E$ (expenditure) and R&Di (infrastructures) and combine them using the following diagram:



So Kc will be equal to

A = high productivity and infrastructure

B = high productivity and low infrastructure (concentration)

C = low productivity and high infrastructure (dispersion)

D = low productivity and infrastructure

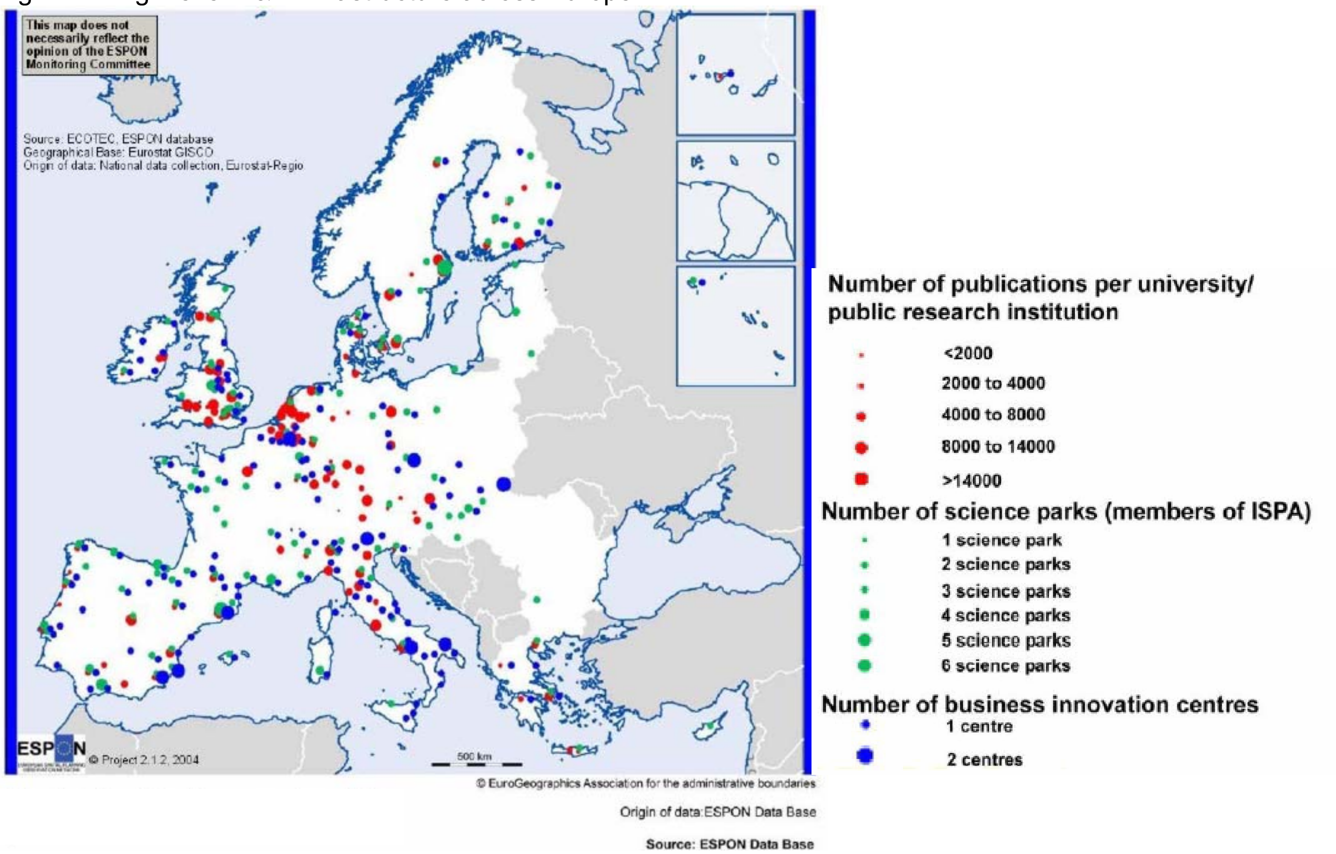
Research & Development Expenditure ($R\&D_E$)

R&D expenditure is a sum of four different kind of expenditure (share on GDP): R&D private business expenditure ($R\&D_{PBE}$), R&D private no profit expenditure ($R\&D_{PNPE}$), R&D government expenditure ($R\&D_{GE}$), R&D higher education expenditure ($R\&D_{HEE}$)

$$R\&D_E = R\&D_{PBE} + R\&D_{PNPE} + R\&D_{GE} + R\&D_{HEE}$$

Research & Development Infrastrucures (R&Di)

Fig A1.4: High level R&D infrastructure across Europe



n° of publications (P) $\Rightarrow P^N{}_j = \dfrac{P_j}{\sqrt{\sum_{j=1}^{m} P_j^2}}$

n° of Science Parks (SP) $\Rightarrow SP^N{}_j = \dfrac{SP_j}{\sqrt{\sum_{j=1}^{m} SP_j^2}}$

n° of Business Innovation Center (BIC) $\Rightarrow BIC^N{}_j = \dfrac{BIC_j}{\sqrt{\sum_{j=1}^{m} BIC_j^2}}$

so using the optimal vector approach we have:

$$R\&D_i = \sqrt{\left(1-P^N\right)^2 + \left(1-SP^N\right)^2 + \left(1-BIC^N\right)^2}$$

A1.2. <u>Technological equipment</u>

A further crucial element that concur to Innovation & Research field is the Technological endowment, which is today considered more and more a positive development engine. Analyzing the ICT impacts in relation to its potentialities in supporting and favouring the territorial development, a wide typological variety of use, access, production, technologies between different territories emerges. These differences are found between customers when income, instruction, sex and nationalities are different, but it is particularly important between developed and less developed regions (Zook, 2000) generating the so-called *digital divide*.

From this point of view one of the most important changes in the telecommunications network market in Europe in the last decade was the movement of the service delivery from the national network towards new carriers that have build a great number of alternative infrastructure at "pan-European" scale. The result is the capability to offer the most part of the services *up to date* directly connecting the greater cities, the financial hubs, the customers and the offices in real time. These pan-European telecommunication networks was become the main road of the information society in Europe and are the infrastructural foundations to deliver competitive services across the Europe.

As the *majors* tend to prefer quick accessibility, high quality and low costs, the localization and extension of these kind of infrastructure have a significant implication for the economic development and for the competitive advantage of the regions and of the European urban centres. Unlikely, for example, a region without accessibility to the infrastructural pan-European network is able to attract economic investments, because unlikely the majors are interested to localize in a such region.

The presence of multiple networks and then a higher competition level in the delivering of the service offers to the enterprises direct access to globally integrated services, higher quality, more protected infrastructure, quicker data communications and (in absence of market bias as cartels, transversal agreements) price decreasing for the service fruition.

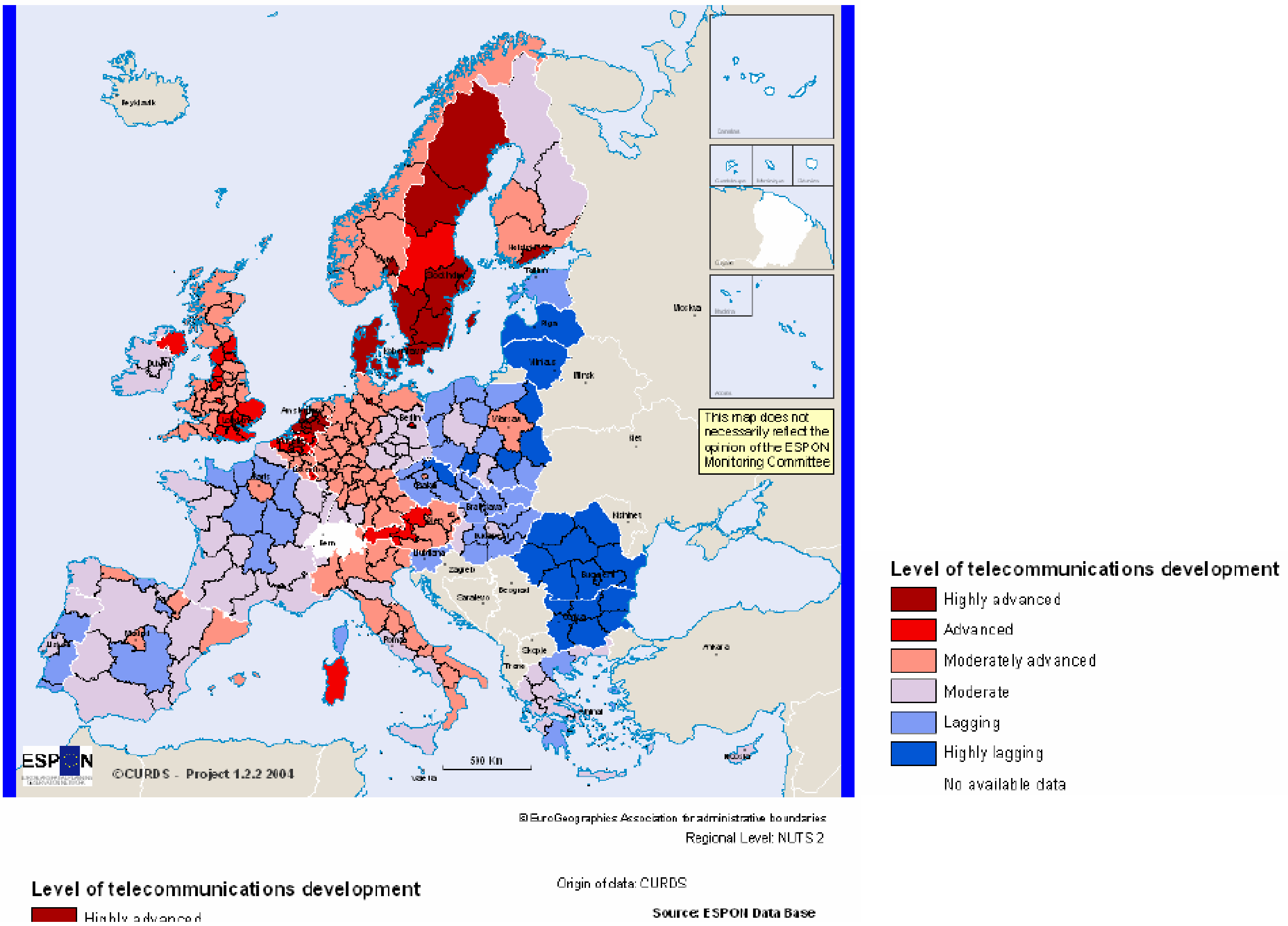
Investment in telecommunication network infrastructures can be seen both regional and urban economic development engine and extremely affordable indicator about the economic development models, so that an analysis of its geographies can be very useful in order to examine the dynamics of the urban and regional development in Europe.

Examining the territorial models linked to the telecommunications it's important to analyze a range of telecommunication technologies and services both to understand the different territorial implications and because these technologies are strictly correlated. Revolutionary systems as the wireless one or the satellite systems, for example, depend on previous investments in fixed network backbone.

According to this vision, the European situation is not homogenous, neither of unambiguous interpretation analyzing both the upgrades benefits by the new computer technologies and the risks connected with their use in a sustainable territorial development vision.

To analyze this typology the results and classification from the ESPON project 1.2.2 could be used, to obtain Te_R as showed in the following map (final report pag. 200).

Fig A1.5: level of telecommunication development



A1.3. <u>Innovative Human Resources (IHR)</u>

Technological endowment is not the only constraint to success and spread of the innovation. This clue comes from the low rate of Internet use in the less developed regions, also where the physical access is available (Pigato, 2001). The access is bound rather with the high costs (it's necessary to hold a computer), from the contents inadequacy (as example the lack of contents in the local language), from the lack of familiarity with the means (Nanthikesan, 2000) and from a not really dynamic institutional atmosphere.

So another fundamental characteristics is the skill level of the human resources available.

The changes in the structure of professions may be a better (more immediate!) indicator of structural changes of the economy than the changes between economic sectors. E.g. the ICT-sector was in its initial phase more easily recognisable through changes in the professional set-up than through sector indicators.

Since early twentieth-century, Max Weber highlighted the central role of social networks as driving forces to information circulation and trust improvement with relevant economic consequences in terms of development because of their capacity to promote exchanges.

Even if Weber did not use the term Human Capital, actually he used the idea of "social networks" as tool able to influence the economic development of a region. The concept of human capital "is defined comprehensively, so that it embraces capacities for interpreting flows of sensory data and structured information required for goal-directed individual actions and inter-personal transactions, and for providing various physical labour service-inputs in ordinary production processes. More conventionally, it subsumes the creative faculties for generating new scientific and technological knowledge, the cognitive basis of entrepreneurship, and the competences for managing market and non-market production as well as household consumption activities". (David, 2001)

Through human capital a region improves its knowledge resources such as information's, skill, trust that allow to the different players to realize targets otherwise not accessible. Moving from individual to aggregate level it's possible to say that a certain territorial context appears rich of human capital depending on individual or collective resident subjects involvement in relationship nets. "Social networks" is so composed from a range of relationships between structural variables and immaterial-relational variables that together concur to define human resources quality.

This link with human resources quality implies sharing of a common language and basic knowledge that allow to best exploit technologies and codified organizational structures (Becattini e Rullani, 1993).

From this point of view human capital can be regarded as local resource able to favour local development and, compared with the past, improves the possibility of territorial players to pro-actively influence the development process.

The latter does not depend on incentive forms or other costs advantages attracting foreign enterprises but on the capacity to use human capital to develop a knowledge and skill set as guarantee for the future of the region. Human capital is so able to improves specialization external economies and to root knowledge in a certain local context.

In terms of competitiveness human capital quality of each territorial system is a strong driving force. Interventions supporting human capital become over and over strategically important so that most competitive regions at international level are those supported by a strong cooperation between social actors, by a high education level and by a balanced employment structure.

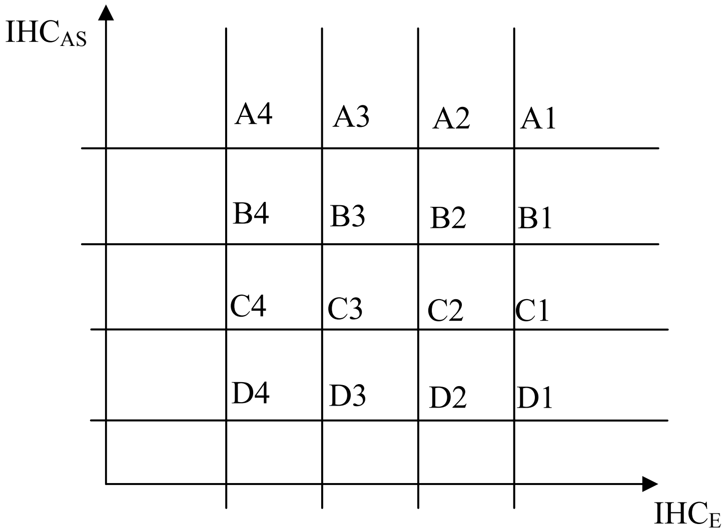
In order to measure the Human Capital it is therefore necessary to find a value for two different sectors: structure and education; and then join them in a synthetic indicator (typology).

The methodology to determine the values is shown below.

Definition

All the human resources actually involved in R&D or such as to potentially produce innovation. In this typology we can distinguish two sectors: structure and educational level of human resources.

Innovative Human Resources (IHR) = f [Innovative Human Capital Education (IHC_E), Human Capital Age Structure (HC_{AS})]
now we have to combine these components to obtain IHR



obtaining a qualitative classification with

A1>A2>…….>B1>B2>…..>D4
A1 =0.90; A2 =0.80; A3 =0.80; A4 =0.75; B1 =0.70; B2 =0.65; B3 =0.60; B4 =0.55; C1 =0.50; C2 =0.45; C3 =0.40; C4 =0.35; D1 =0.30; D2 =0.25; D3 =0.20; D4 =0.15;

A1.3.1. Innovative Human Capital (education)

Innovative Human Capital Education (IHC_E) is a function of
Tertiary education attainment level (P_H) (by third cohesion report)
number of Science and Technology degree (STd)
early school leavers (ESL)
life-long learning (LLL)

so

$$IHC_E = \sqrt{(1-P_H)^2 + ESL^2 + (1-STd)^2 + (1-LLL)^2}$$

normalizing

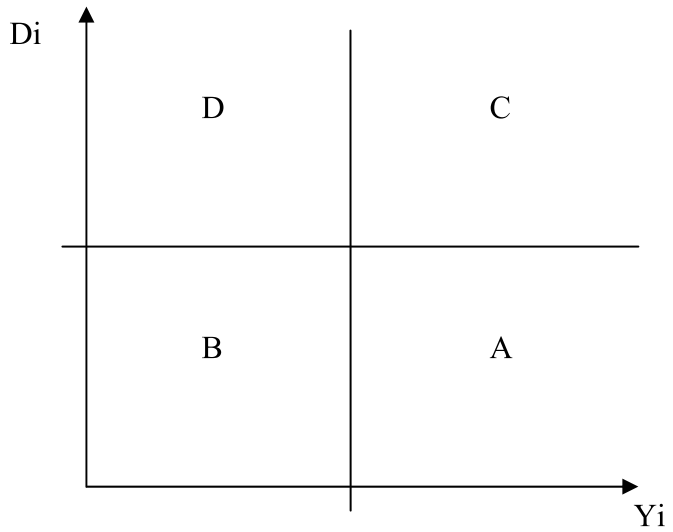
$$IHC^N{}_{E\,j} = \frac{IHC_{E\,j}}{\sqrt{\sum_{j=1}^{m} IHC_{E\,j}^2}}$$

A1.3.2. Human Capital (structure)

Human Capital Age structure (IHCAS) could be measured using the Dipendency index (Di) and the Youth index (Yi) and combining them, after the normalization, as shown in the following diagram

$$Di = \frac{POP_{0-14} + POP_{65-over65}}{POP_{15-64}}$$

$$Yi = \frac{POP_{0-40}}{POP_{Tot}}$$



So IHCAS will be

A = high active population % and high young population %

B = high active population % and low young population %

C = low active population % and high young population %

D = low active population % and low young population %

A2. GLOBAL LOCAL INTERACTION

global local interaction	International cooperation on environment	general environment concerns		SEA, EIA, EMAS, Århus Convention, Espoo Convention
		atmosphere		Kyoto Protocoll, Aircraft Engine Emissions, LRTAP, UNFCCC, Protection of the Ozone Layer
		hazardous substances		CRTD, Basel Convention, Convention on the Transboundary Effects of Industrial Accidents, ADN, Rotterdam Convention, Stockholm Convention on POPs
		Marine Environment		London Convention 1972, MARPOL 73/78, Bunkers Convention, 1969 CLC, AFS Convention, 1992 Fund Convention, HNS Convention, OPRC, Intervention Convention, LOS Convention
		Marine Living Resources		CCAMLR, ICCAT, ICRW, SPAW, IAC, IOSEA, AIDCP
		Nature Conservation and Terrestrial Living Resources		The Antarctic Treaty, World Heritage Convention, Convention on Biological Diversity (CBD), Bern Convention, CMS, CITES, Ramsar Convention, ICAM Protocoll, CCD, FAO International Undertaking on Plant Genetic Resources, ITPGRFA, ITTA1994
		Nuclear Safety		Assistance Convention, Notification Convention, Convention on Nuclear Safety, Vienna Convention on Civil Liability for Nuclear Damage
		Freshwater Resources		ECE Water Convention
	Social interaction	Phisical interaction	**Migration (cfr. ESPON project Demography)**	
			Tourism	Inbound (International Tourist Arrivals ITA, International Tourist Receipts ITR); Outbound (International Tourist Arrivals, International Tourist Expenditures); Accomodation capacity
			Cultural exchange	n° student (erasmus, socrates, leonardo,…)/tot student; researchers movements/tot researchers
		Virtual society	Population	n° internet users, population with tertiary education, n° pop. e-learning
			Institutions	n° municipalities with e-government, ICT expenditure, GDP pro capita
			Firms	n° firms with internet access, n° firms with own web-site, n° firms e-

				commerce
	Economy and Finance	productive system identity		districts, local productive systems, big firms, product trademarks, territorial trademarks, typical events (n°, expenditure, affluence),
		Energy (cfr ESPON .... Thematic maps)	production	
			consumption	
		internazionalization		foreign percentage market, FDI, foreign productive units, export/import at regional level
		Strategic localization	**natural hazard (cfr. ESPON ......thematic maps)**	
			accessibility	**Phisical (cfr ESPON project 1.2.1 and 2.1.1)**
				Virtual=technological equipment (cfr ESPON project 1.1.2)
			costs	fuel price, **energy price (cfr. ESPON Project)**, fiscal pressure
			Knowledge creation facilities (cfr. ESPON 2.1.2 thematic maps)	R&D (public R&D expenditures and business R&D expenditures as a percentage of GDP per capita)
				R&D infrastructures (Science Parks that are members of the International Association of Science Parks (ISAP), n° Business Innovation Centres, Most Actively Publishing Universities and Public Research Institutes)
			Human capital (education)	population with tertiary education, population in life-long learning, public expenditure for education, science and technology graduates, early school leavers

Globalization increases both opportunities and competition for investment. It offers opportunities for local businesses to develop new markets and also presents challenges from international competitors entering local markets. Multi-site, multi-national manufacturing, banking and service corporations vie globally to find cost efficient sites in which to locate. Technologically advanced growth industries require more highly specialized skills and technology infrastructure.

The set of changes in the context of development (at different geographic scales) refers to what Dicken (1998) called the new 'geo-economy'. This consist of three factors, namely: a) space reducing technologies in transport and communication; b) the technological and managerial changes in production of goods and services and, last but not least, c) the growing volume of people, capital, and firms that are mobile across (parts of) the globe.

In this new global vision the Local Territories, make the difference in the international competition, therefore they present the local community's comparative advantage and hence its ability to attract and retain investment. Even small towns and their surrounding rural regions can find niche opportunities at a national or international level by building on their inherent advantages.

The global – local interaction is the process by which public, business and nongovernmental sector partners work collectively to create better conditions for economic development and the growth of international exchange. The aim is to improve the quality of relation between local and global market. So global – local interaction can be considerate like the ability of the regional territories to having relations of international exchange.

Practicing improve this interaction means working directly to build up the economic capacity of a local area to improve its economic future. Prioritizing the local economy and increasing the productive capacity of local firms, entrepreneurs and workers is crucial if communities are to succeed in the fast changing world. The ability of communities and their government to improve the interaction lives of their members today depends upon them being able to adapt to the fast changing and increasingly competitive international market environment.

So this component seeks to investigate the relationship and the ongoing re-alignment between public, private and civil society actors in territorial interaction processes, with special emphasis on the role of regional territories as the domain where local and global forces interact most strategically. So we must analyze some thematic fields:

Environmental and cooperation agreements
Social
Economy and Finance

How these forces of global integration affect local conditions and livelihoods is a important question. This component taking this perspective are interested in finding out to what extent, and under what conditions, economic globalisation offers opportunities for improvement to actors and groups at the local level.

In this respect Global-local interaction (GLI) will be function of International cooperation on environment (ICE), Social Interaction (GLSI) and Economical and Financial Interaction (EFI)

GLI = f (ICE, SI, EFI)

And according to the methodology

$$GLI = \sqrt{ICE^2 + GLSI^2 + EFI^2}$$

A2.1. International cooperation on environment

This section concernes the most important international agreements on environment and development. According to the Fridtjof Nansen Institute[1] , we have divided the agreements into eight subsections:

General Environmental Concerns;

Atmosphere;

Hazardous Substances;

Marine Environment;

Marine Living Resources;

Nature Conservation and Terrestrial Living Resources;

Nuclear Safety;

Freshwater Resources.

The terms used in this section, denoting various stages in the status of participation related to international agreements, are legal-technical ones, based on the Law of Treaties as contained in the 1969 Vienna Convention on the Law of Treaties and in the 1986 Vienna Convention on the Law of Treaties between States and International Organizations or between International Organizations, as well as in customary international law.

Upon the negotiation of a treaty, there are often several stages required before it enters into force:

Adoption is the formal act by which the form and content of a proposed treaty text are established. As a general rule, the adoption of the text of a treaty takes place through the expression of the consent of the states participating in

[1] Yearbook of International Co-operation on Environment and Development, 2004

the treaty-making process. As a rule, however, adoption does not yet mean a consent of a state to be bound by a treaty.

Signature may sometimes be definitive, meaning that it establishes the consent of the state to be bound by the treaty. This is usual in most bilateral treaties. For multilateral treaties, however, the signature is as a rule not definitive, meaning that the treaty is subject to ratification, acceptance, or approval in order to enter into force. Although in those cases the signature does not establish the consent to be bound, it is a means of authentication and expresses the willingness of the signatory state to continue the treaty-making process (i.e. to proceed to ratification, acceptance, or approval). It also creates an obligation to refrain, in good faith, from acts that would defeat the object and the purpose of the treaty.

Ratification defines an international act whereby a state indicates its consent to be bound to a treaty if the parties intended to show their consent by such an act. In the case of multilateral treaties the usual procedure is for the state to notify the depositary of its ratification; the depositary keeps all parties informed of the situation regarding ratifications. The institution of ratification grants states the necessary time-frame to seek the required approval for the treaty on the domestic level and to enact the necessary legislation to give domestic effect to that treaty.

Acceptance or **approval** have the same legal effect as ratification and consequently express the consent of a state to be bound by a treaty. In the practice of certain states, acceptance and approval have been used instead of ratification when, at a national level, constitutional law does not require the treaty to be ratified by the head of state.

Accession is the act whereby a state accepts the offer or the opportunity to become a party to a treaty already negotiated and signed by other states. It has the same legal effect as ratification. Accession usually occurs after the treaty has entered into force. The conditions under which accession may occur and the procedure involved depend on the provisions of the treaty; a treaty might provide for the accession of all other states or for a limited and defined number of states.

Entry into force of an international treaty does not necessarily coincide with its ratification (acceptance, approval) by individual states. It is common for multilateral treaties to provide for a fixed number of states to express their consent for entry into force. Some treaties provide for additional conditions to be satisfied, e.g. by specifying that a certain category of states must be among the consenters. The treaty may also provide for an additional time period to elapse after the required number of countries have expressed their consent or the conditions have been satisfied. A treaty enters into force for those states which gave the required consent. A treaty may also provide that, upon certain conditions having been met, it shall come into force provisionally.

According to this differences we can attribute a different value to the different stage of a treaty

Signed = 0.5
Ratified, approved and acceded = 1

To define the value of the typology (International Cooperation on Environment = ICE) we can use the following relation

$$ICE = \sqrt{\sum_{1}^{q}(1 - K_s)^2}$$

where
s =1,….,q = number of subsections

and where

$$K_s = \frac{\sum_{r=1}^{p} x_{sr}}{r}$$

where
r = generic treaty of the s-th subsection
p = number of treaty of the s-th subsection

A2.2. Social interaction

Social interaction (GLSI) is a function of physical interaction (GLPI) and virtual interaction (GLVI) that is

GLSI = f(GLPI,GLVI)

$$GLSI=\sqrt{GLPI^2+GLVI^2}$$

A2.2.1. Physical interaction

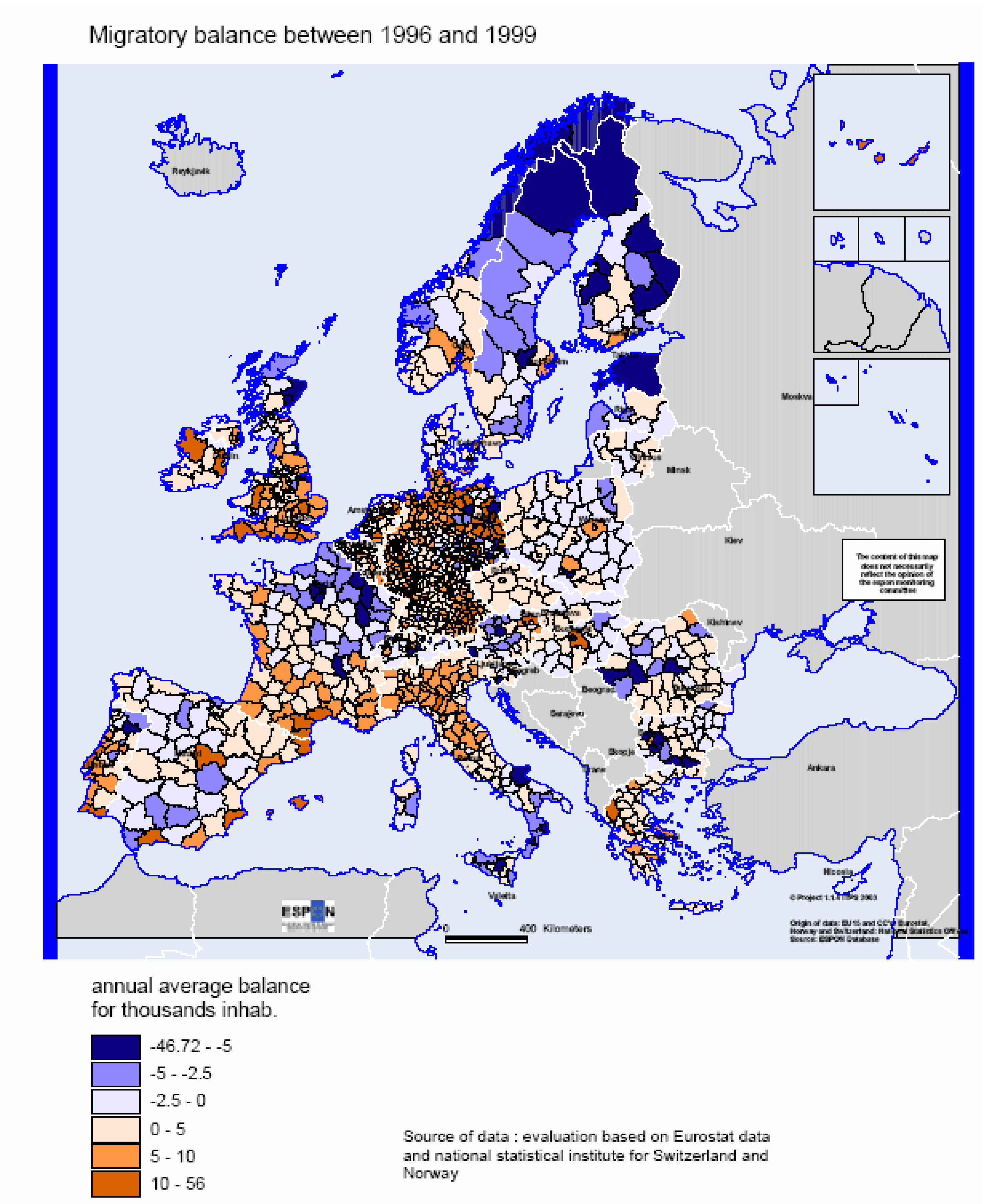
Phisical interaction (GLPI) is a function of Migration (MI), Tourism (TI) and Cultural exchange (CEx), that is

GLPI = f(MI, TI, CEx)

To find a relationship among TI, MI and CEx we use the approach of the multidimensional optimal vector. So according to the variables' typology – distance from an optimal value (relative value) or absolute value (as shown in the following paragraphs) – we have:

$$GLPI=\sqrt{TI^2+(1-MI)^2+CEx^2}$$

A2.2.1.1.Migration



Source ESPON Project 1.1.4

According to this project we have 6 classes for the migratory balance (MB)

A = 0.9, $\forall$ MB: -46.72 < MB < -5

B = 0.7, $\forall$ MB: -5 < MB < -2.5

C = 0.6, $\forall$ MB: -2.5 < MB < 0

$D = 0.5, \forall\ MB: 0 < MB < 5$

$E = 0.3, \forall\ MB: 5 < MB < 10$

$F = 0.1, \forall\ MB: 10 < MB < 56$

A2.2.1.2.Tourism

There can be no denying that tourism is a major global economic force. Hardly a day goes by without a new pronouncement about the wider significance of what many call the world’s largest industry. International tourism has grown substantially in recent decades, with technological improvements, rising living standards and broader processes of globalization leading to rapid increases in visitor numbers.

A key issue, in the development of local economy in the global market, is the way in which these processes of global tourism expansion, uneven development and, in some cases, retraction, play themselves at the sub-national levels of regions and local communities.

Tthe regional territories (and their land use) are all influenced by tourism to some degree and also play important roles in shaping the structure and nature of the local economy. To help us conceptualize the links that exist between the global and the local we adopt the notion of the global–local nexus (figure below).

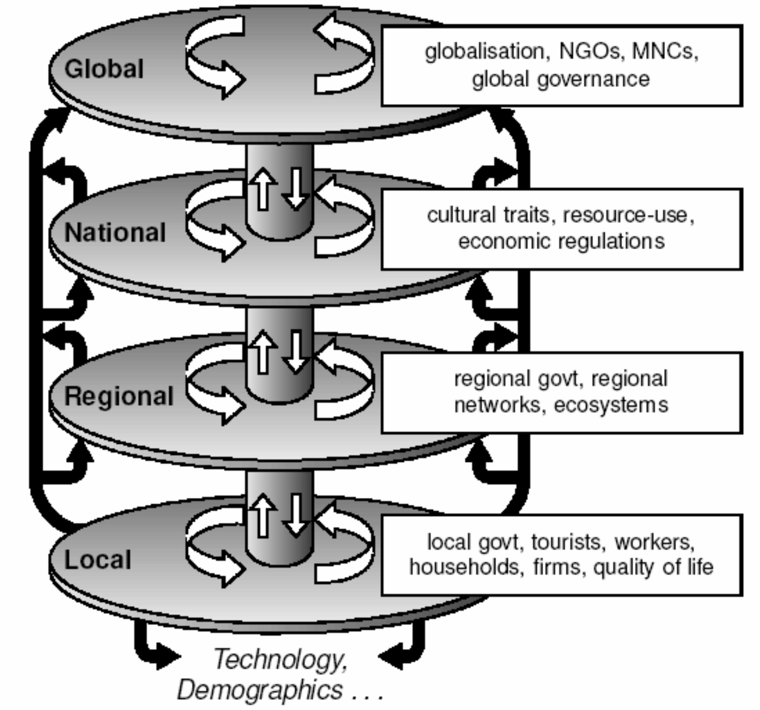


Figure Tourism and the global–local nexus (Alger 1988)[2]

Therefore it is essential to look carefully at how interactions between the global and the local shape development outcomes for individuals, households, communities and regions. Tourism, in simple terms, must be viewed as a transaction process which is at once driven by the global priorities of multi-national corporations, geo-political forces and broader forces of economic change, and the complexities of the local – where residents, visitors, workers, governments and entrepreneurs interact each other.
To measure the value of tourist flows of a region fundamental elements are: Inbound Tourism (IT), Outbound Tourism (OT) and Accomodation Capacity (AC).

To find a relationship among IT, OT and AC we use the approach of the multidimensional optimal vector. So it's possible to construct a Tourism Index (TI):

TI=f(IT, OT, AC)

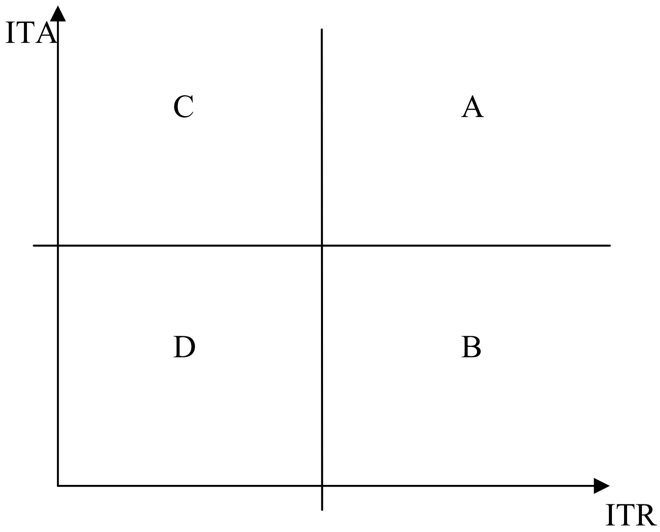
[2] Alger, C. F. 1988. Perceiving, analysing and coping with the local-global nexus. International Social Science Journal 40: 321–39.

$$TI = \sqrt{(1-IT)^2 + (1-OT)^2 + (1-AC)^2}$$

Inbound Tourism (IT)

IT =f(International Tourist Arrivals ITA, International Tourist Receipts ITR)

To classify the value of IT we use the following diagram:



Where

A = 0.9 = many tourists and receipts

B = 0.7 = few tourist and many receipts (elite tourism)

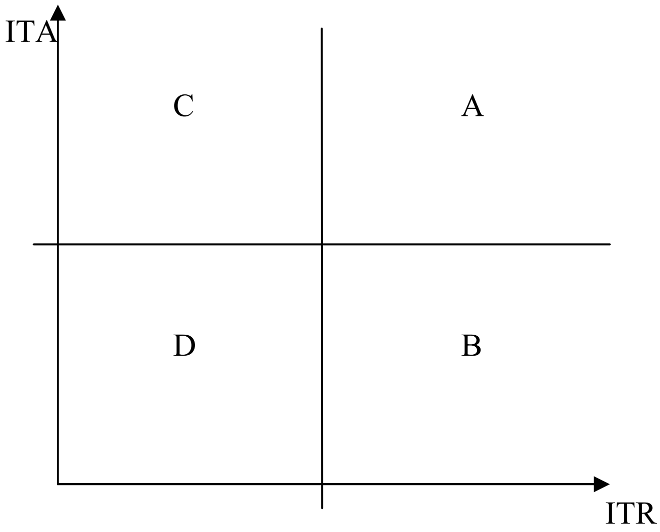
C = 0.4 = many tourists and few receipts (mass tourism)

D = 0.1 = few tourist and few receipts

Outbound Tourism (OT)

OT=f(International Tourist Arrivals, International Tourist Expenditures)

To classify the value of IT we use the following diagram:



Where

A = 0.9 = many tourists and receipts

B = 0.7 = few tourist and many receipts (elite tourism)

C = 0.4 = many tourists and few receipts (mass tourism)

D = 0.1 = few tourist and few receipts

Accomodation capacity (AC)

To measure the accommodation capacity we use the number of rooms present in the territory classifying then it according to the following rank

A = ….<AC< ….= 0.9

B = ….<AC< ….= 0.7

C = ….<AC< ….= 0.5

D = ….<AC< ….= 0.3

E = ….<AC< ….= 0.1

(to be developed after data checking)

A2.2.1.3.Cultural exchange (Cex)

Like the tourism another important element of the relationship between the local society and the "global-local" interaction is the cultural exchange that is a function of Students mobility (SM) and Researchers Mobility (RM)

CEx = f(SM,RM)

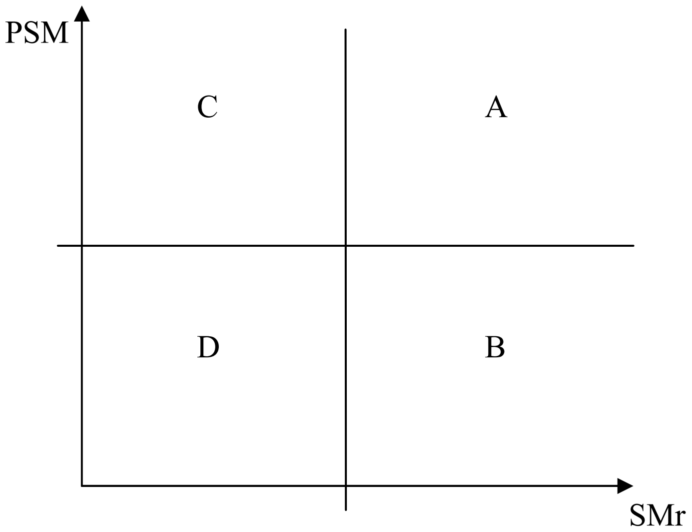
$$CEx = \sqrt{(1-SM)^2 + (1-RM)^2}$$

<u>Students Mobility (SM)</u>

n° programs supporting student mobility (PSM)

n° student involved/tot student (SMr)

To classify the value of SM we use the following diagram:



Where

A = 0.9 = many programs (supply) and students (demand)

B = 0.7 = few programs (supply) and many students (demand)

C = 0.4 = many programs (supply) and few students (demand)

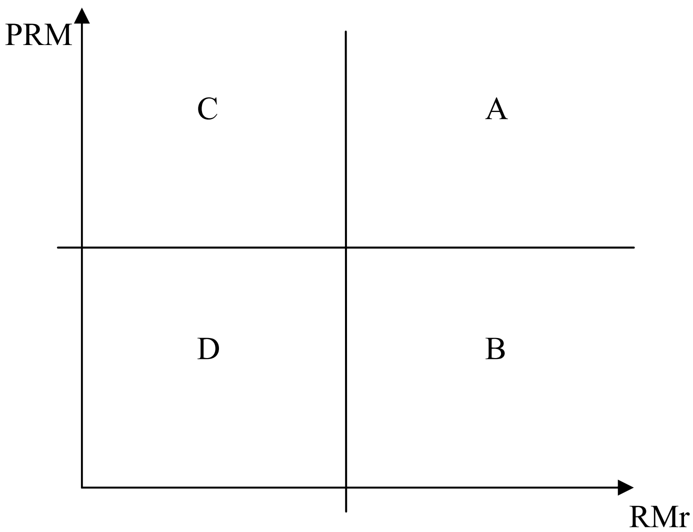
D = 0.1= few programs (supply) and few students (demand)

Researchers Mobility (RM)

n° programs supporting researchers mobility (PRM)

n° researchers involved/tot researchers (RMr)

To classify the value of RM we use the following diagram:



Where

A = 0.9 = many programs (supply) and researchers (demand)

B = 0.7 = few programs (supply) and many researchers (demand)

C = 0. 4 = many programs (supply) and few researchers (demand)

D = 0.1 = few programs (supply) and few researchers (demand)

A2.2.2 Virtual society (VS)

VS = Cfr. Virtual Society (Annex 1 – Innovation and Research)

$$VS = \sqrt{(1-VF)^2 + (1-VP)^2 + (1-VI)^2}$$

A2.3. Economical and Financial Interaction

Economical and financial interaction (EFI) is a function of Productive System identity (PSI), Energy self-sufficiency index (ESSI), Internationalization (I) and Strategic localization (SL)

$$EFI = \sqrt{PSI^2 + (1-ESSI)^2 + I^2 + SL^2}$$

A2.3.1. Productive system identity

Identity is the quality of a product, service or landscape, which is unique, different, distinguishable and distinguished in the wide definition of the term. Identity is a cultural quality which is inherent to individuals and goods allowing them to be recognized by others as special and from that perspective they bring forward something different contributing to the enrichment of society at large. Promoting development with territorial or local identity implies privileging what distinguishes a geographic location allowing it to compete in absolute advantages as a result of its uniqueness and in comparative advantages related to better conditions in delivering a product or service.

The local productive system provides the framework under which labour, capital, and product markets operate. These rules and institutions are fundamental for productivity because they facilitate the efficient operation of markets. They need to be transparent and comprehensible to ensure that individuals and organisations recognise their rights and responsibilities.

The economic base of a local productive system may be identified with one or several model productive (agricultural, manufacturing or service activities e.g. trading or tourism). In addition to this the other local economic activities supply the local market and the development and growth of the local productive system. The economic base normally consists of one or more geographical concentrations (clusters, district) of local producers. Firms district and clusters may grow and specialise in their activity. This specialisation itself is an important growth mechanism and to creation a local identity of production that can move the all economy. Thanks to specialisation local producers may achieve internal economies of scale, which in their turn may generate increasing returns. This results in enhancing the competitive and the capability of the territorial to attract new capital.

Productive system identity Index (PSI) is a function of Productive System, Trademarks, Typical Events.

So we can write
PSI = f(PS,T,TE)

$$PSI = \sqrt{(1-PSI)^2 + (1-T)^2 + TE^2}$$

Analyzing each component we have:

Productive systems identity (PSI)

First step: description the entrepreneurial background
The entrepreneurial background (FB) is function of Firm Territorial Density (F_{TD}) and Firm's employees Density (F_{ED})
(cfr. Annex A1 Innovation & Research determinant pag. 7):

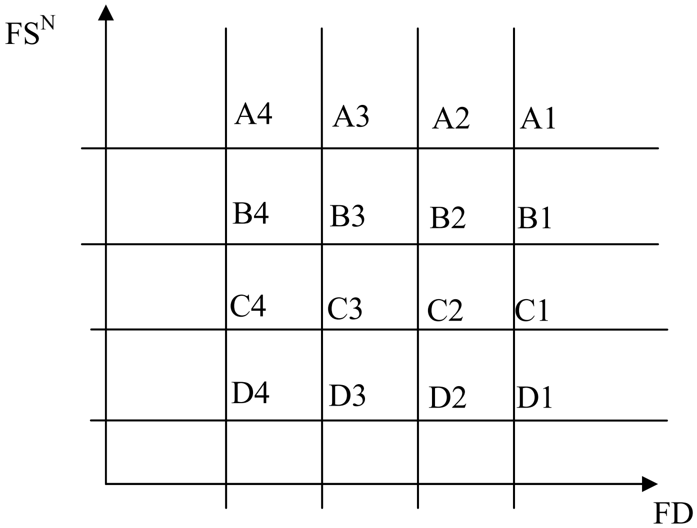
Second Step: definition of Firm size
The firm' size index (FS^N) depend on the following rank according to the average of employers (Em)
$FS^N = 0.9 \ \forall\, 250 < Em$
$FS^N = 0.7 \ \forall\, 50 < Em < 249$
$FS^N = 0.5 \ \forall\, 20 < Em < 49$
$FS^N = 0.3 \ \forall\, 10 < Em < 19$

$FS^N = 0.1 \ \forall\ 1 < Em < 9$

where $Em = \frac{n\ total\ employers}{n\ total\ firms}$

Third step: definition of the Productive System Identity

To define the final value of PSI it's necessary to find the relationship between PS and FD. This could be done according to the following matrix/diagram



obtaining a qualitative classification with

A1>A2>…….>B1>B2>…..>D4

2) **Trademarks (T)** = n° of product trademarks

3) **Typical events (TE)** =f(n° typical events(NTE), public expenditure for typical events on GDP (ETE_R), affluence (ATE))

$$NTE^N{}_j = \frac{NTE_j}{\sqrt{\sum_{j=1}^{m} NTE_j^2}}$$

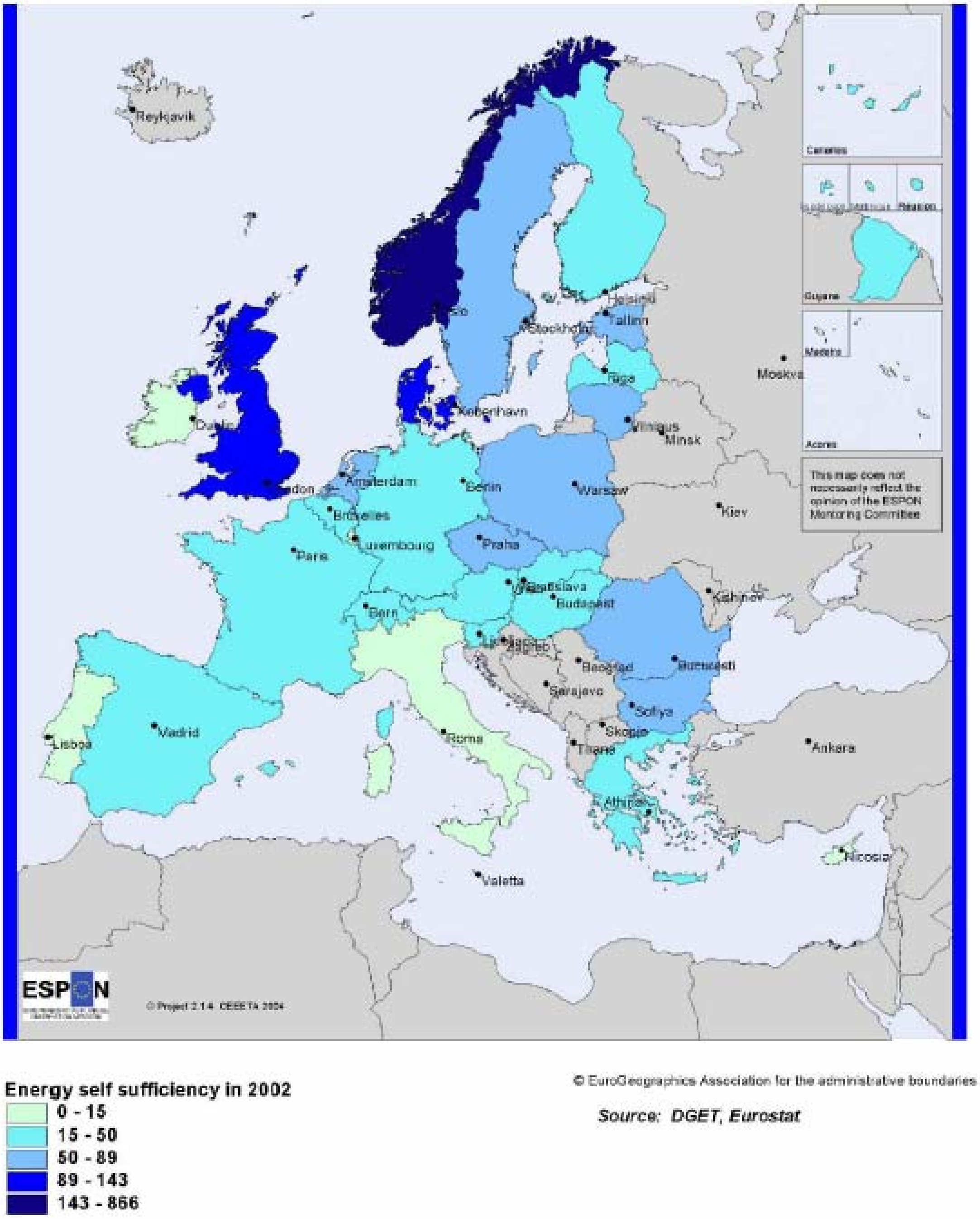
$$ETE^N{}_{Rj} = \frac{NTE_{jR}}{\sqrt{\sum_{j=1}^{m} NTE_{jR}^2}}$$

$$ATE^N{}_j = \frac{ATE_j}{\sqrt{\sum_{j=1}^{m} ATE_j^2}}$$

$$TE = \sqrt{\left(1 - NTE^N\right)^2 + \left(1 - ETE^N{}_R\right)^2 + \left(1 - ATE^N\right)^2}$$

A2.3.2. Energy self-sufficiency index

Energy self-sufficiency in Europe in 2002



Source Espon project 2.1.4

According to this map we have 5 classes for the energy self-sufficency index (ESSI)

A = 0.9 if 143 <ESSI < 866

B = 0.7 if 89 <ESSI < 143

C = 0.5 if 50 <ESSI < 89

D = 0.3 if 15 <ESSI < 50

E = 0.1 if 0 <ESSI < 15

A2.3.3. Internationalization

The assessment of degree of actual and potential internationalisation has been the subject of quite a few pieces of research (Dunning and Pearce, 1981; Ietto-Gillies, 1989, 1998 and 2001; Sullivan, 1994; UNCTAD, 1995) and viewed from various perspectives. In particular:

The degree of **aggregation** at which we want to operate. Firm or industry levels: large companies and/or SMEs; the macroeconomy (at the local, regional or national levels).

The **internationalization mode** we are interested in: trade; FDI; internal and external business networks; porfolio investment.

The choice regarding the **degree of aggregation** depends on the specific research project and problem one is working on and the type of effects to be analysed.

Similarly with the **internationalisation mode** chosen for investigation. In this case, however, there are considerable complications due to the strong interconnections between the various modes. One internationalisation mode is likely to affect others either in a complementary or substitution relationship. Moreover, the effects and relationship can be contemporaneous or evolve in a time sequence. These relationships and effects are particularly strong in the case of trade and FDI (Cantwell, 1994; Ietto-Gillies, 2001: ch. 2).

In the development of specific indices, the perspectives mentioned in the previous section are relevant because they define the boundaries of our specific research. However, whatever these boundaries, and therefore, whatever the level of aggregation, internationalisation mode and type of activity we want to concentrate on, there are two specific dimensions on the degree of internationalisation which are both relevant in the construction of indices. They are:

The degree of **intensity** of foreign activities with respect to the size of domestic activities (local, regional or national)

The degree of geographical **extensity** that is the degree to which the activity extends to many countries or regions.

By the **degree of intensity** I mean the degree to which activities are internationalised in relation to the overall size of those activities within a specific industry or country or region. For example the extent of the country's foreign investment in relation to the size of the domestic economy (whether measured by GDP or GDFCF).

The **degree of extensity** aims to assess the geographical scope of the internationalisation process. It usually results in indicators of: (i) the number of countries into which the region as a whole invests or trades with; or (ii) the degree of spatial concentration of activities; or (iii) the degree of 'gravitation' of foreign activities towards specific regions or areas.

Starting from these consideration in our methodology Internationalization (I) is a function of Trade Openess level (TOl), Firm size (FS), Degree of Intensity (DI), Export/import added value (EI_{AV}), Degree of extensity (DE)

$$I = \sqrt{\left(1 - TOl^{N}\right)^{2} + \left(1 - FS^{N}\right)^{2} + \left(1 - FDI^{N}{}_{R}\right)^{2} + \left(1 - EI^{N}{}_{AV}\right)^{2} + \left(1 - DE^{N}\right)^{2}}$$

where

1) $TOl = \dfrac{\exp + imp}{GDP}$ and $TOl^{N}{}_{j} = \dfrac{TOl_{j}}{\sqrt{\sum_{j=1}^{m} TOl_{j}^{2}}}$

2) FS^N (cfr. Annex A1 Innovation & Research pag 40)

3) $EI_{AV} = \dfrac{\exp - imp}{added\ \ value}$ and $EI_{AV}{}^{N}{}_{j} = \dfrac{EI_{AV\,j}}{\sqrt{\sum_{j=1}^{m} EI_{AV\,j}^{\,2}}}$

4) $DI = \dfrac{FDI}{GDP}$ where FDI is Foreign Direct Investment and $DI^{N}{}_{j} = \dfrac{DI_{j}}{\sqrt{\sum_{j=1}^{m} DI_{j}^{2}}}$

5) DE = the number of countries into which the region as a whole invests or trades with $DE^{N}{}_{j} = \dfrac{DE_{j}}{\sqrt{\sum_{j=1}^{m} DE_{j}^{2}}}$

A2.3.4. Strategic localization (SL)

Macro-economic, fiscal and monetary policies affect local territories. National regulatory and other legal conditions (e.g. telecommunications deregulation, environmental standards) also influence the shape of local business climates, which can help or harm local economic development goals.

These trends all have local economic consequences on the possibility to attract new investments. the threats as well as the opportunities of local territories need to be taken in consideration if we want to measure the global-local interaction.

The irreversible process of globalization are fundamentally changing the way enterprises make their choices. The global spread of the free market economy, the liberalization of key industries, ongoing work on a global political and economic framework, and the implementation of a uniform technical and logistics infrastructure have brought all areas of the world closer than ever before, even as key technologies from various business sectors have converged to provide an unprecedented level of technical infrastructure around the world.

At the same time, the ICT has leveled the playing field for companies and economies throughout the world, providing a low-cost global platform for advertising, marketing, sales, distribution, and support. Entry barriers for foreign markets have tumbled, but competition on domestic ones is increasing dramatically, and the whole world is watching what you'll do. Companies must think far ahead when reorienting their strategies, plan effectively, and implement fast.

To be successful in this new challenge, organizations must modify their offerings to give them the look and feel of locally-made products. So the key element for the strategic localization (SL) became: natural hazard (NH), accessibility (A); costs (C), knowledge creation facilities (KCf), human capital education level (HCel) that is

$$SL = f(NH, A, C)$$

To find the value of "Strategic Localization" we use the approach of the multidimensional optimal vector. So we have:

SL=f(NH, A, C, KCf, HCel)

$$SL=\sqrt{(1-NH)^2+(1-A)^2+(1-C)^2+(1-KCf)^2+(1-HCel)^2}$$

A2.3.4.1. Natural Hazard (NH)

The natural hazard we take in account came from the available risk maps (Espon project 1.3.1 second interim report pagg. 104 - 108), specifically are the following: Flood risk (F), Winter storms risk (WS), Earthquake risk (EQ), Volcanic eruption (VE) risk.

$$\mathrm{EQ}^{\mathrm{N}}{}_{j}=\frac{EQ_j}{\sqrt{\sum_{j=1}^{m}EQ_j^2}}\qquad \mathrm{W}S^{\mathrm{N}}{}_{j}=\frac{WS_j}{\sqrt{\sum_{j=1}^{m}WS_j^2}}\qquad \mathrm{F}^{\mathrm{N}}{}_{j}=\frac{F_j}{\sqrt{\sum_{j=1}^{m}F_j^2}}\qquad \mathrm{VE}^{\mathrm{N}}{}_{j}=\frac{VE_j}{\sqrt{\sum_{j=1}^{m}VE_j^2}}$$

Combining the values coming from them we have

$$NH=\sqrt{(1-F)^2+(1-WS)^2+(1-EQ)^2+(1-VE)^2}$$

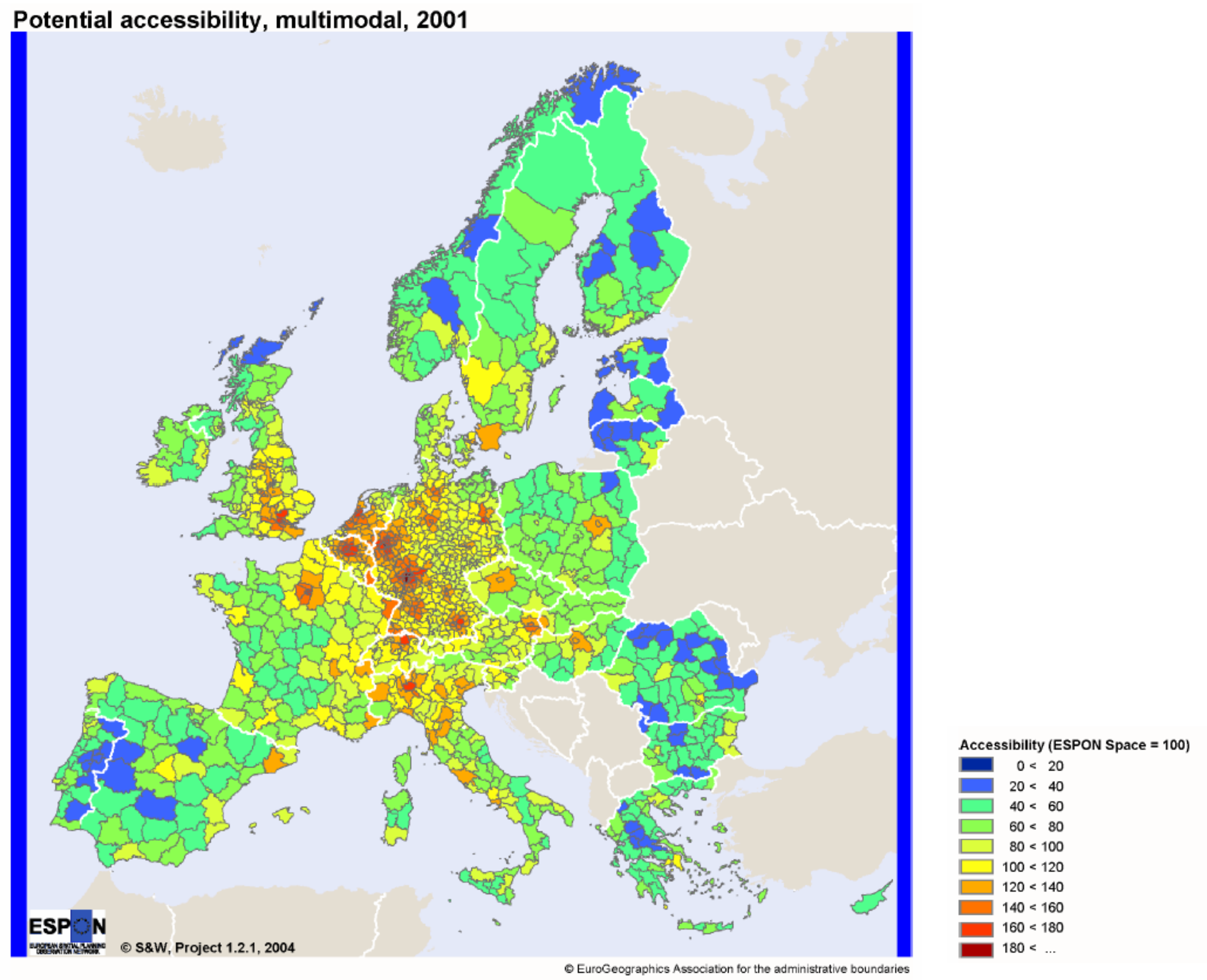
A2.3.4.2. Accessibility (A)

Accessibility (A) is a function of Pysical accessibility (PA) and Virtual accessibility (VA)
A= f(PA,VA)

$$A=\sqrt{(1-PA)^2+(1-VA)^2}$$

Phisical Accessibility (PA)

According with Espon project 1.2.1. to assess the European territory in terms of physical accessibility we use potential multimodal accessibility because it *"integrates the modal indicators into one indicator expressing the combined* *effect of alternative modes for a location. The aggregation over modes is a major advantage over single mode indicators".* (Espon project 1.2.1. final report pag. 257)



Virtual Accessibility (VA) = technical equipment (cfr Annex 1)

A2.3.4.3.Costs (C)

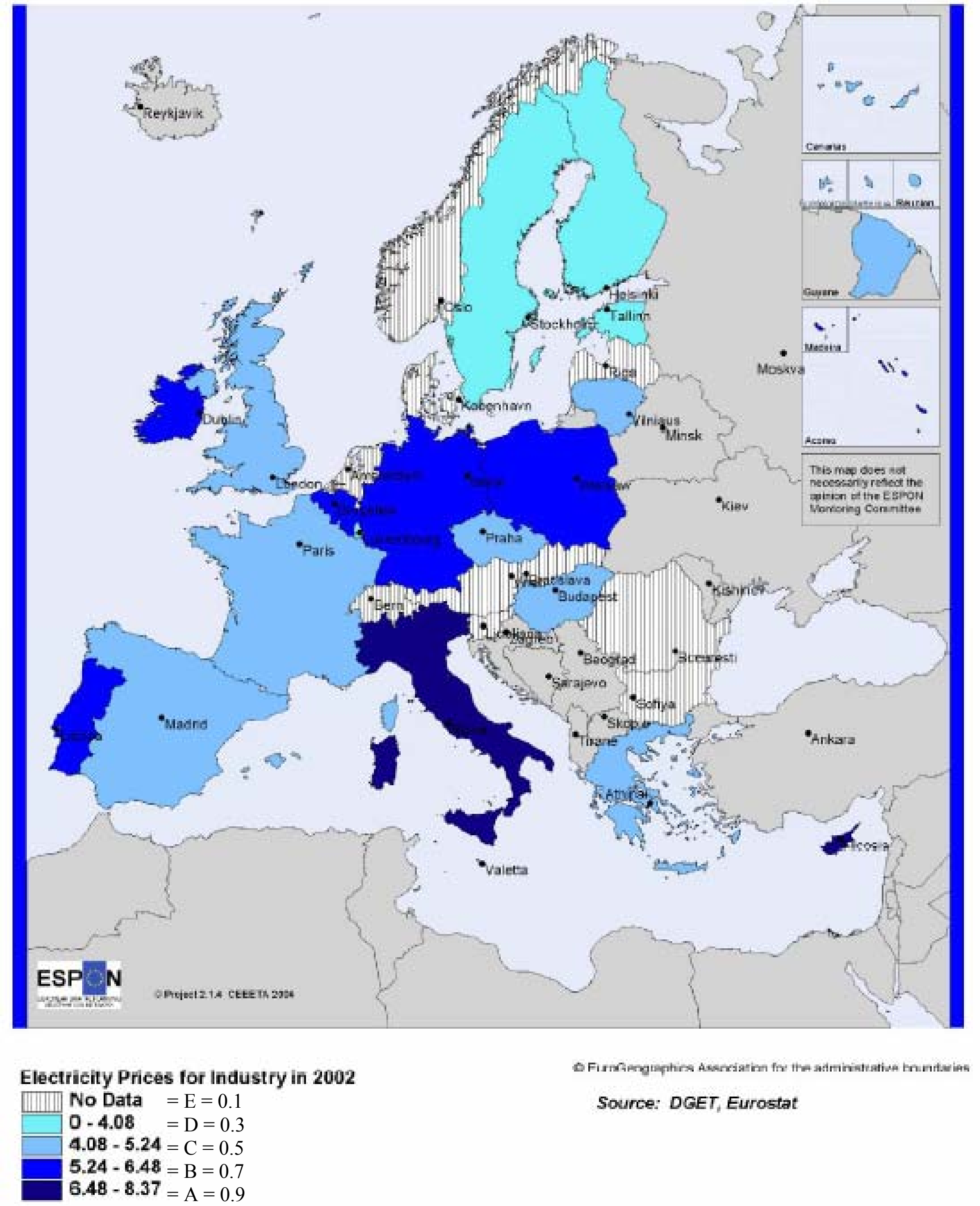
Costs are a function of energy price (EP), fuel price (FP) and fiscal pressure (FiP)

C=f(fuel price, energy price, fiscal pressure)

$$C=\sqrt{EP^2+(1-FP)^2+(1-FiP)^2}$$

Energy price

electricity prices for industrial sectors (EPi)



Source ESPON Project 2.1.4

energy prices for residential sectors (EPr)

energy prices for transport sectors (EPt)

Energy price (EP) = f(EPi, EPr,EPt)

$$EP = \sqrt{(1 - EPi)^2 + (1 - E\,\mathrm{Pr})^2 + (1 - EPt)^2}$$

Fuel price = (cfr. ESPON Project 2.1.4)

Fiscal Pressure (FiP)

% on GDP per capita

A2.3.4.4. Knowledge creation facilities

KCf = Cfr. Knowledge Creation facilities (Annex 1 – Innovation and Research pag. 18)

A2.3.4.5. Human Resources

HCe = Cfr. Human Capital education (Annex 1 – Innovation and Research pag. 22)

A3. QUALITY

Quality (process, environmental, production, service)	Life quality	economic variables		GDP per capita (PPS) or the difference of the GDP per capita (PPS) from the average of the EU, consumption per capita, consumer-price index, level of unemployment (unemployed/active population), level of poverty (population beneath the poverty line/total population)
		social variables	human resources	Human capital education, human capital age structure
			criminality	criminality index
			Demography (cfr ESPON project)	population density, hope of life, fertility rate, dependency index rate
			equal opportunities	n° active population/total n° active population, n° of diplomaeds high school/ total n° of high school diplomaeds, n° of graduates/total n° of graduates
		environmental quality	Quality of natural element and level of noise	air, water, and soil, noise index
			public and private institution responsability	ISO, EMAS, SEA, EIA GPP
			land use (cfr.ESPON ….thematic maps)	green area per capita, protected green area per capita, artificial surface per capita, less favourite areas per capita, agricolture area per capita
			natural hazard (cfr. ESPON ……thematic maps)	earthquake, flood events, forest fires, volcano risk
		infrastructural variables	welfare	n° of hospital beds, n° of policy offices, n° of post offices
			leisure	cultural opportunities (n° of theatres, n° of cinemas), sport facilities, n° of hotels beds
			phisical accessibility (cfr. ESPON 1,21 and 2.1.1thematic maps)	roads, railways, airports, harbours

			technological equipment (cfr. Espon 1.1.2 thematic maps)	tv, broadband, mobile, digital tv, telephony
	Environmental quality	**Energy consumption (cfr ESPON .... Thematic maps)**	consumption of energy from not renewable resources	KW produced by arbon, oil, gas ,
			consumption of energy from renewable resources	KW produced by renewable resources
			consumption of energy from nuclear	KW produced by nuclear
		Waste	Municipal Waste	production of solid waste
			Hazardous Waste	production of solid waste
			Nuclear Waste	Radioactive waste generated by uranium mining and milling, fuel enrichment, decontamination and decommissioning
			Recycling	
		land use (cfr.ESPON thematic maps)		green area per capita, protected green area per capita, artificial surface per capita, less favourite areas per capita, agricolture area per capita
	Local Government quality (cfr ESPON governance project)	welfare		n° of hospital beds, n° of policy offices, n° of post offices
		participation		voters (% of voting rights population), access to administrations web-site, • citizen Involvement rate in local government
		Use of economic resources		Public expendiute (% of GDP)

The study of this determinant consists of the analysis of data grouped into 3 different categories[3]:

Quality of life (LQ)

Environmental Quality (EQ)

Local Government Quality (LGQ)

In this respect Quality (Q) will be function of :

GLI = f (LQ, LQ, LGQ)

And according to the methodology

$$Q= \sqrt{LQ^2 + EQ^2 + LGQ^2}$$

A3.1. **Quality of life (LQ)**

"Quality of life" is a very common expression of our present language, even though its real content should be carefully analysed. Up to 10 years ago in fact, it was a common belief that the growth of economic wealth was the only indicator for the quality of life (progress=wealth) without taking into account social and environmental problems. Since then, the idea of quality of life has extended. Joachim Vogel[4] has well explained this change: "Quality of Life (QoL) gives the possibility to enjoy health and personal security, to express one's own personality by experiencing a cultural growth, a professional satisfaction or improvement, a feeling of self-accomplishment in enjoying one's own spare time, as well as to have at one's disposal enough material goods and services, human relationships, personal freedom and possibilities to participate in the public sector".

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[3] Thanks to a multiphase weighting system, a general index of territorial quality can be obtained (on different scales). The indicators are classified into: Quality indicators when by increasing, they produce an improvement in quality and Trouble indicators when by increasing, they produce a worsening in quality

4 Vogel, J (2001) The Swedish ULF system. I: Quality of Life Indexes for National Policy: Review and Agenda for Research. Special issue of Social Indicators 2001.

On the contrary, Prof. Lanfranco Senn[5] states that the three cornerstones for the quality of life are in the first place the environement, but also the economic wealth and the access to services. The territorial accessibility and availability of services are further parameters of quality: the more the services are easily reacheable and close to one another, the more is the quality of life in terms of time saving.

A way to measure the level of the "quality life" was introduced with "The first Human Development Report" by combining indicators of life expectancy, educational attainment and income into a composite human development index, the Human Development Index. The breakthrough for the HDI was to find a common measuring rod for the socio-economic distance travelled. The HDI sets a minimum and a maximum for each dimension and then shows where each country stands in relation to these scales -expressed as a value between 0 and 1. It also permits instructive comparisons of the experiences within and between different countries.
Starting to this new approach we must define a method that take into account several economic and social aspects which directly and indirectly have an impact on the citizens' life. To this purpose, our model uses 4 sector indicators:

Economic variables (LQ_{EV});
Social variables (LQ_{SC});
Environmental quality (LQ_{EQ});
Infrastructural variables (LQ_{IV}).

To obtain the Life Quality we can use the following relation:

$$\mathrm{LQ} = \sqrt{LQ_{EV}^{2} + LQ_{SV}^{2} + LQ_{EQ}^{2} + LQ_{IV}^{2}}$$

These 4 sectors include a set of variables which globally lead to an evaluation.

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A3.1.1. Economic variables (LQ_{EV})

From the economic variables point of view, the quality of life is directly proportional to the GDP level and to the consumption level, but indirectly proportional to the level of unemployement and poverty.
Thus, in order to survey this sector of the quality of life, the indicators taken into account are:

“GDP per capita (PPS)” (GDP_{PPS})
Per capita consumption and Consumer-price index (Con);
Level of unemployement (unemployed/active population) (Uemp);
Level of poverty (population beneath the poverty line/total population) (Pr).

And according to the methodology:

$$LQ_{EV} = \sqrt{\left(1 - GDP^{N}{}_{PPS}\right)^2 + \left(1 - Con^{N}{}_{j}\right)^2 + \left(1 - Uemp^{N}{}_{j}\right)^2 + \left(1 - \Pr_j^N\right)^2}$$

Therefore a high level of quality will be had in presence of a high level of GDP, consumption and a low level of uneployment and poverty.

LQ_{EV} = f [$GDP_{PPS,}$ Con, Uemp, Pr]

where Con= f [Con_{cp}, CPI]

<u>Income</u>

$$GDP^{N}{}_{PPS\,j} = \frac{GDP_{PPS\,j}}{\sqrt{\sum_{j=1}^{m} GDP_{PPS\,j}^{\;2}}}$$

<u>Consumption (Con)</u>

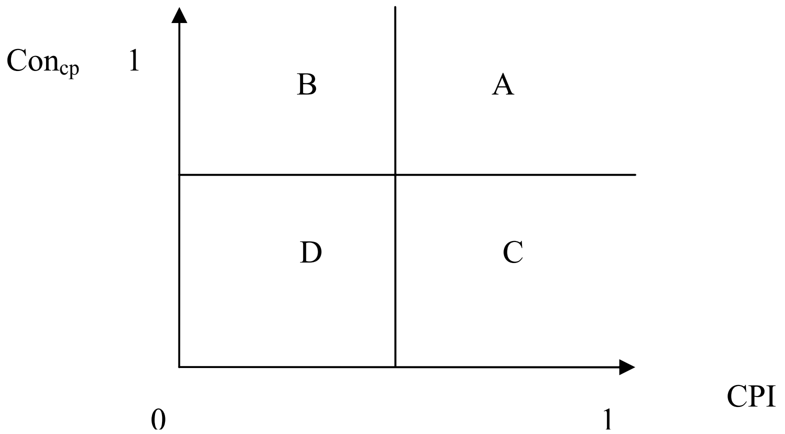
1° step index of consumption per capita

$$Con^{N}{}_{pc\,j} = \frac{Con_{pc\,j}}{\sqrt{\sum_{j=1}^{m} Con_{pc\,j}^{2}}}$$

2° step index of consumer price

$$CPI^{N}{}_{j} = \frac{Con_{j}}{\sqrt{\sum_{j=1}^{m} Con_{j}^{2}}}$$

3° step: definition of Consumption level (Con_j)



whit A>B>C>D where A= 1; B=1/2A; C=1/2B; D=1/2C

A= 1; B=0.5; C=0.25; D= 0.125

Unemployment

$$Uemp^{N}{}_{j} = 1 - \frac{Unemp_{j}}{\sqrt{\sum_{j=1}^{m} Unep_{j}^{2}}}$$

Poverty rate

$$\Pr^{N}{}_{j} = 1 - \frac{\Pr_j}{\sqrt{\sum_{j=1}^{m} \Pr_j^2}}$$

A3.1.2. Social variables

When wondering about the meaning of “quality of life” we are about to put questions which concern in the first place the domain of ethics and the ways it has an influence on the traditional economic analysis.

Everyday experience shows how some human factors, such as solidarity, voluntary work etc., are essential to the implementation of social and hence economic relations, so that some phenomena can be considered as complementary to competition.

Hence, the definition of the principles identifying respectable standards of life and the inclusion in these life standards of as much population as possible in order to give an idea of sustainable development under the economic, environmental, social and cultural point of view, is the primary goal of every modernisation process.

However, the quality of life can be measured and quantified by means of specific indicators set by the scientific research in the last decades.

These indicators reveal, in the first place, the causes of divergence between economic wealth and welfare and, in the second place, how crucial ethical and emotional evaluations can be in the determination of a set of values which are well far beyond the concept of usefulness.

By using these indexes is possible to observe how the GDP growth does not necessarily lead to a growth of the welfare. The most paradoxical result in the evaluation of the set of values determining quality of life highlights that economic growth, assessed in terms of GDP, salaries, prices etc., and welfare, assessed in terms of employment/unemployment, justice/injustice, corruption, crime, discrimination etc., hardly ever are the same thing even though, if properly integrated, they can give a reasonable exhaustive outline of the quality of life for this kind of determinant.

The daily life, therefore, shows us as some factors "human", what the level of human capital (schooling), the social uneasiness (crime), the level of social integration (equal opportunities) and the demografic variable, have a direct influence on the quality of the life.

Human resources: % of graduates/thirty year-old population, % of diplomaeds high school/nineteen year-old population, population in life-long learning (HC_{LQ});
Criminality: criminality index (n° of crimes for 100.000 inhabitants) (Cr_{LQ});
Demography: population density, hope of life, fertility rate, dependency index rate (pop<14+pop>65 / pop 14-65) (Dem_{LQ});
Equal opportunity: n° active population/total n° active population, n° of diplomaeds high school/ total n° of high school diplomaeds, n° of graduates/total n° of graduates (EO_{LQ});

And according to the methodology to find a relationship among HC_{LQ}, Cr_{LQ}, Dem_{LQ} and EO_{LQ} , and find the contribution of social variables of life quality dimension we can use the following relation:

$$\mathrm{LQ}_{SV} = \sqrt{HC_{LQ}^{\ 2} + (1 - Cr_{LQ})^2 + Dem_{LQ}^{\ 2} + EO_{LQ}^{\ 2}}$$

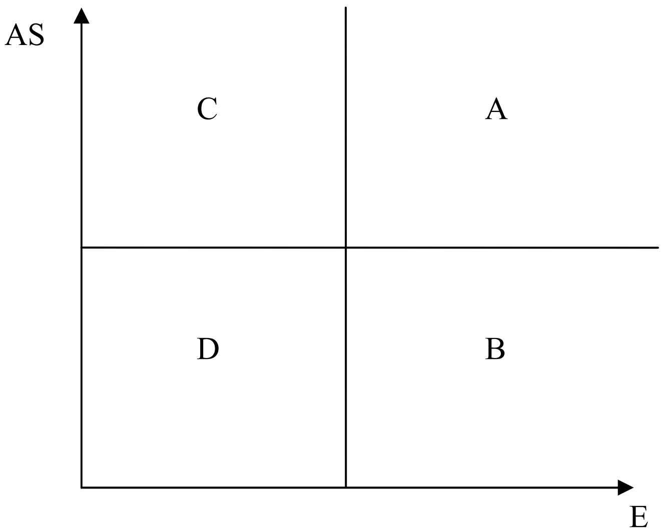
Human Resources

Both individuals and countries benefit from education. For individuals, the potential benefits lie in general quality of life and in the economic returns of sustained, satisfying employment. For countries, the potential benefits lie in economic growth and the development of shared values that underpin social cohesion. Countries make substantial investments from both public and private sources in education, both formal provisions and informal provisions in the community and the workplace. It is important to ensure that the education programmes they support are effective and efficient and that the benefits are distributed equitably.

In this typology we can distinguish two sectors: structure and educational level of human resources.

Human Resources (HR) = f [Human Capital Education (HC_E), Human Capital Age Structure (HC_{AS})]

now we have to combine these components to obtain HR



where

A = high demand and offer

B = high demand and low offer

C = low demand and high offer

D = low demand and offer

A3.1.2.1.Human Capital (education)

Human Capital Education (HC_E) is a function of

tertiary education attainment level (PH) (by third cohesion report)

early school leavers (ESL)

life-long learning (LLL)

so

$$HC_E = \sqrt{(1-PH)^2 + ESL^2 + (1-LLL)^2}$$

Human Capital (structure)

Cfr. Annex A1 Innovation & Research pag. 24

A3.1.2.2.Criminality (Cr)

Criminality index = number of crimes every 1000 inhabitant

$$Cr^{N}{}_{LQ} = 1 - \frac{Crj}{\sqrt{\sum_{j=1}^{m} Cr_j^2}}$$

A3.1.2.3.Demography (Dem)

Demography and its key elements is an important element to calculate overall human impact on the life quality. A society that has a "right" density of population, a high hope of life, a good degree of fertility rate and a low index of dependency index rate will have a population with standards of life more higher than the other realities.

Population density (PD)

PDj= population/ territorial extension

PD^N = ideal value or average PDj

1° step

$$\text{PD average} = \frac{\sum_{j=1}^{m} PD_j}{j}$$

2°step

$$PD^{N}{}_{j} = \frac{|PD_j - PD_{average}|}{\sqrt{\sum_{j=1}^{m} (PD_j - PD_{average})^2}}$$

Life expectancy (LH) Fertility Dependency index

$$\mathrm{LH}^{\mathrm{N}}{}_j = \frac{LH_j}{\sqrt{\sum_{j=1}^{m} LH_j^2}} \qquad \mathrm{Fer}^{\mathrm{N}}{}_j = \frac{Fer_j}{\sqrt{\sum_{j=1}^{m} Fer_j^2}} \qquad \mathrm{DepI}^{\mathrm{N}}{}_j = \frac{DepI_j}{\sqrt{\sum_{j=1}^{m} DepI_j^2}}$$

so the incidence of demography variables of social variables index (Dem) is:

$$\mathrm{Dem} = \sqrt{(1-PD^N)^2 + (1-LH^N)^2 + (1-Fer^N)^2 + (1-DepI^N)^2}$$

A3.1.2.4.Equal opportunity (EO)

The equal opportunity index is measured trough several rates: Women Employment (W_{Emp}); Women graduated (W_{Grad}); Women in diplomaeds (Wdip)

$$\mathrm{Wemp}^{\mathrm{N}}{}_{\mathrm{j}} = \frac{Wemp_j}{\sqrt{\sum_{j=1}^{m} Wemp_j^2}} \qquad \mathrm{W_{Grad}}{}^{N}{}_j = \frac{W_{grad\ j}}{\sqrt{\sum_{j=1}^{m} W_{Grad\ j}^{\ 2}}} \qquad \mathrm{Wss}^{\mathrm{N}}{}_j = \frac{Wss_j}{\sqrt{\sum_{j=1}^{m} Wdip_j^2}}$$

so the equal opportunità index is given:

$$\mathrm{EO}_{LQ} = \sqrt{(1-Wemp^N)^2 + (1-W_{Grad}{}^N)^2 + (1-Wdip^N)^2}$$

A3.1.3. Environmental Quality (EQ)

In the process of analysis and evaluation of the environmental quality, it is of utmost importance to collect all the environmental data for the evaluation of the territory both on the basis of its characteristics, and of a qualitative and quantitative evaluation, by integrating all natural and anthropical factors which

contribute to the determination of the environment conditions and of any possible critical factors.
In fact, any governance activity bringing changes to the pre-existing physical conditions, should be well aware of the practical implications of the decisions taken, as they have a direct impact on the effectiveness of all human actions by conditioning populations’ health and their quality of life in general.
The quality of life is therefore determined by the environmental relations deriving from the adopted environmental policies (enterprise and public administration’s responsibilities: ISO, EMAS, VAS, VIA and GPP “Green Public Procurement”), from data concerning human activities (Soil deployment: green area per capita, protected green area per capita, artificial surface per capita, less favourite areas per capita, agriculture area per capita) and from risk data of natural hazards (earthquakes, flood events, forest fires, volcano risk) as well as from information about the measures needed to prevent, mitigate and retrieve possible conditions of environmental degradation.

The environmental quality therefore is influenced positively by human activities that assume the responability for the actors of the action and they move to an objective commune to improve the quality of the life, to decrease the uneasiness determined by actions purely speculative as the environmental pollution or as the calamitous events of difficult control:

Quality of natural element (air, water, and soil) and level of noise (QNE);
Public and private institution responsability: ISO, EMAS, VAS, VIA, GPP (IR);
Land use: green area per capita, protected green area per capita, artificial surface per capita, less favourite areas per capita, agricolture area per capita (LU)
natural hazard: earthquake, flood events, forest fires volcano risk (NH);

To find a relationship among QNE, IR, LU and NH and find the contribution of environmental quality of life quality dimension we can use the following approach:

$$\mathrm{LQ}_{EQ} = \sqrt{QNE_{total}{}^{2} + IR^{2} + LU^{2} + NH^{2}}$$

A3.1.3.1.Quality of natural element (air, water, soil) and level of noise

$$\mathrm{QNE}_{air\ j}{}^{N} = \frac{QNEair_j}{\sqrt{\sum_{j=1}^{m} QNEair_j^2}} \quad \mathrm{QNE}_{water\ j}{}^{N} = \frac{QNE_{water\ j}}{\sqrt{\sum_{j=1}^{m} QNE_{water\ j}{}^{2}}} \quad \mathrm{QNE}_{soil\ j}{}^{N} = \frac{QNE_{soil\ j}}{\sqrt{\sum_{j=1}^{m} QNE_{soil\ j}{}^{2}}} \quad \mathrm{N}^{\mathrm{N}}{}_{j} = \frac{N_j}{\sqrt{\sum_{j=1}^{m} N_j^2}}$$

$$QNE_{total} = \sqrt{(1-QNE_{air}{}^{N})^2 + (1-QNE_{WATER}{}^{N})^2 + (1-QNE_{SOIL}{}^{N})^2 + (1-N^{N})^2}$$

A3.1.3.2.Public and private institution responsibility (IR)

Public and private institution responsibility: ISO, EMAS, VAS, VIA,GPP;

$$\mathrm{ISO}^{\mathrm{N}}{}_{j} = \frac{ISO_j}{\sqrt{\sum_{j=1}^{m} ISO_j^2}} \qquad \mathrm{E}MAS_j^N = \frac{EMAS_j}{\sqrt{\sum_{j=1}^{m} EMAS_j^2}} \qquad \mathrm{SEA}^{\mathrm{N}}{}_{j} = \frac{SEA_j}{\sqrt{\sum_{j=1}^{m} SEA_j^2}}$$

$$\mathrm{GPP}^{\mathrm{N}}{}_{j} = \frac{GPP_j}{\sqrt{\sum_{j=1}^{m} GPP_j^2}} \qquad \mathrm{EIA}^{\mathrm{N}}{}_{j} = \frac{EIA_j}{\sqrt{\sum_{j=1}^{m} EIA_j^2}}$$

the institutional (public and private) responsibility index will be:

$$\mathrm{IR}_{LQ} = \sqrt{(1-ISO^{N})^2 + (1-EMAS^{N})^2 + (1-SEA^{N})^2 + (1-EIA^{N})^2 + (1-GPP^{N})^2}$$

A3.1.3.3.Land use (LU)

Land use: green area per capita (GPA), protected green area per capita(PGA), artificial surface per capita (AS), less favourite areas per capita (LFA), agricolture area per capita (AA);

$$\mathrm{GPA}_{\mathrm{j}}{}^{\mathrm{N}} = \frac{GPA_j}{\sqrt{\sum_{j=1}^{m} GPA_j^2}} \qquad \mathrm{PGA}^{\mathrm{N}}{}_{j} = \frac{PGA_j}{\sqrt{\sum_{j=1}^{m} PGA_j^2}} \qquad \mathrm{AS}^{\mathrm{N}}{}_{j} = 1 - \frac{AS_j}{\sqrt{\sum_{j=1}^{m} AS_j^2}}$$

$$\mathrm{LFA}^{\mathrm{N}}{}_j = 1 - \frac{LFA_j}{\sqrt{\sum_{j=1}^{m} LFA_j^2}} \qquad \mathrm{AA}^{\mathrm{N}}{}_j = \frac{AA_j}{\sqrt{\sum_{j=1}^{m} AA_j^2}}$$

the land use (LU) index will be:

$$\mathrm{LU}_{LQ} = \sqrt{(1 - GPA^N)^2 + (1 - PGA^N)^2 + (1 - LFA^N)^2 + (1 - FA^N)^2 + (1 - GAA^N)^2}$$

A3.1.3.4.Natural hazard (NH)

Cfr. Annex A2 Global Local Interaction pag. 47

A3.1.4. Infrastructural Variables

The tradition in the application of the environmental studies has produced an effective field of application in the assessment of the environmental quality by using indicators which not only represent, but also determine and describe, the causes which have altered the state of resources, as well as the corrective actions taken by society to heal degradation.

An integrated approach in the reporting process on the state of the environment carried out at any geographical scale, is mainly a conceptual approach to represent and summarize the complexity of the environmental changes, without loosing the flexibility required to represent the characteristics of any environmental phenomenon related to the policies applied to it.

The instruments used to implement this process of integration are many and of different nature: from the adoption of the code of conduct, to the implementation of targeted communication methods (e.g. environmental and social balance, sustainability reports etc.) and from environmental and social certifications to donations and sponsorships.

A transposition of the CSR's methods is an important management tool to entrepreneurship intended both for the public and private sectors in order to improve financial performances, processes of internal cohesion and operations, as well as to become a tool for the diversification of the market and a synonym

of “value” for the citizens and the consumers as far as it contributes to the improvement of their quality of life.
Since both private and public companies play, above all others, a role of social interest, the expectation is to meet these infrastructural variables into those companies applying models of social cohesion, where the attention to the achievement of the economic and financial balance is subject to the assessment of the value attributed to the achievement of the objectives of this kind of companies (e.g. prevention, treatment and rehabilitation services within hospitals, accommodation, welcome services, entertainment for the spare time, accessibility to services and availability of technologies able to facilitate the use of the above-mentioned infrastructures).

Also the "infrastructural variables" considered as system integrated and not as single material and immaterial structures determine modifications and improvements of the quality of the life to determinate an integrated network of services to use and to advantage of the citizens/consumers:

Welfare structure: n° of hospital beds, n° of policy offices, n° of post offices;
Leisure structure: cultural opportunities (n° of theatres, n° of cinemas), sport facilities, n° of hotels beds;
Physical accessibility: road, railway, airports, harbours (see proj. ESPON 1.2.1 e 2.1.1);
Technological equipment: tv, broadband, mobile, digital tv, telephony (see Annex 1:Innovation&Research);

And according to the methodology to find a relationship among Welfare structure (WS); Leisure structure (LS); Physical accessibility (PA);, Tecnological equipment (TE), and find the contribution of Infrastructural Variables of life quality dimension we use the following approach:

$$\mathrm{LQ}_{IV} = \sqrt{WS^2 + LS^2 + PA^2 + TE^{\ 2}}$$

A3.1.4.1.Welfare structure (WS)

The indicators that we use to measure this category are: n° of hospital beds every 1000 habitant (HB), n° of police officers/ total inhabitants (PO), n° of post offices every 10.000 inhabitant (PostO)

$$\mathrm{BH}^{\mathrm{N}}{}_j = \frac{BH_j}{\sqrt{\sum_{j=1}^{m} BH_j^2}} \qquad \mathrm{PO}^{\mathrm{N}}{}_j = \frac{PO_j}{\sqrt{\sum_{j=1}^{m} PO_j^2}} \qquad \mathrm{PostO}^{\mathrm{N}}{}_j = \frac{PostO_j}{\sqrt{\sum_{j=1}^{m} PostO_j^2}}$$

the welfare structure (WS) index will be:

$$\mathrm{WS}_{LQ} = \sqrt{(1 - HB^N)^2 + (1 - PO^N)^2 + (1 - PostO^N)^2}$$

A3.1.4.2.Leisure structure (LS)

The indicators that we use to measure this category are: cultural opportunities (n° of theatres, n° of cinemas) every 1000 inhabitants (CO), sport facilities every 1000 inhabitants (SF), n° of hotels beds every 1000 inhabitants (HF); n° of access of libraries every 1000 inhabitants (LA)

$$\mathrm{CO}^{\mathrm{N}}{}_j = \frac{CO_j}{\sqrt{\sum_{j=1}^{m} CO_j^2}} \qquad \mathrm{SF}^{\mathrm{N}}{}_j = 1 - \frac{FS_j}{\sqrt{\sum_{j=1}^{m} FS_j^2}} \qquad \mathrm{HF}^{\mathrm{N}}{}_j = 1 - \frac{HF_j}{\sqrt{\sum_{j=1}^{m} HF_j^2}} \qquad \mathrm{LA}^{\mathrm{N}}{}_j = 1 - \frac{LA_j}{\sqrt{\sum_{j=1}^{m} LA_j^2}}$$

the leisure structure (LS) index will be:

$$\mathrm{NH}_{LQ} = \sqrt{(1 - CO^N)^2 + (1 - SF^N)^2 + (1 - FS^N)^2 + (1 - LA^N)^2}$$

A3.1.4.3.Physical accessibility (A)

Cfr. Annex A2 Global local interaction pag. 46;

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A3.1.4.4.Tecnological equipment (TE)

Cfr. Annex A1 Innovation & Research pag. 18;

A3.2. Environmental Quality

To obtain the **Environmental Quality** we can use the following relation:

$$\mathrm{EQ} = \sqrt{EC^2 + LU^2 + W^2}$$

A3.2.1. Energy consumption (EC)

It is widely acknowledged that emissions of greenhouse gases by human society are causing climate change on a global scale. Most greenhouse gas emissions are caused by the burning of fossil fuels for energy and by industrial processes such as petroleum refining and cement manufacturing. The dominant greenhouse gas is carbon dioxide.

Although the precise impacts are not known, it is expected that climate change will cause rising sea levels (threatening millions of people), changing precipitation patterns, thinning of polar ice caps, heat waves, floods, droughts, water shortages and disruptions of forests and agriculture. Northern regions are expected to be particularly hard hit. The Arctic Region is already experiencing warmer weather, shorter winters, melting permafrost, wildlife impacts and disruptions of traditional Inuit lifestyles.

Consuming energy causes a wide range of health and environmental impacts, from the habitat loss associated with exploration for fossil fuels and the construction of hydroelectric facilities to the pollution resulting from the burning of fossil fuels.

Environmental impacts are caused by the actions required to produce energy, including oil and gas exploration and development, coal mining, and the construction of nuclear reactors, hydroelectric dams and reservoirs. Environmental impacts also include the pollution generated by burning oil, gas

and coal or disposing of nuclear waste and the impacts of dams on aquatic ecosystems.
Fossil fuel combustion is the main source of three major air pollution problems – climate change, acid deposition and urban smog. The energy consumption (from not renewable resources) produces 90% of carbon dioxide emissions, 55% of sulphur dioxide emissions, 90% of nitrogen oxide emissions and 55% of volatile organic compound emissions.
Hydroelectric projects flood large tracts of land, have major impacts on river systems and cause the release of both methane (a greenhouse gas) and mercury (a toxic heavy metal). Nuclear power facilities require uranium mining and produce nuclear waste for which no safe disposal system currently exists.

So the energy efficiency measures the amount of energy required to produce a certain amount of Gross Domestic Product (GDP). The more energy efficient a country becomes, the lower the environmental impacts of both producing and using energy, unless economic growth and population growth out-pace increases in energy efficiency.
Energy efficiency not only has environmental implications but also economic consequences. Weak energy efficiency undermines a country's international competitiveness because using more energy generally means goods and services are produced at a higher cost.

The variables that we can use for measure the contribution of Energy Consumption to the Environmental Quality (EC) are: consumption of energy from not renewable resources (ECnRR) (carbon, oil, gas); consumption of energy from renewable resources (ECRR); consumption of energy from nuclear (NEC)

$$\mathrm{EC} = f\left(ECnRR; ECRR; NEC\right)$$

$$\mathrm{E}CnRR^{\mathrm{N}}{}_{j} = \frac{\mathrm{E}CnRR_{j}}{\sqrt{\sum_{j=1}^{m}\mathrm{E}CnRR_{j}^{2}}} \qquad \mathrm{E}CRR^{\mathrm{N}}{}_{j} = \frac{\mathrm{E}CRR_{j}}{\sqrt{\sum_{j=1}^{m}\mathrm{E}CRR_{j}^{2}}} \qquad \mathrm{N}EC^{\mathrm{N}}{}_{j} = \frac{\mathrm{N}EC_{j}}{\sqrt{\sum_{j=1}^{m}\mathrm{N}EC_{j}^{2}}}$$

$$EC = \sqrt{(1-ECnRR^{N})^{2} + (1-ECRR^{N})^{2} + (1-NEC^{N})^{2}}$$

A3.2.2. Waste (W)

The variables that we can use for measure this sector are:

municipal waste (MW),

hazardous waste (HW);

nuclear waste (NW),

level of recycling (R)

Therefore the value of Waste (W) in according to the methodology will be:

$$\mathrm{W} = \sqrt{(1-MW^{N})^{2} + (1-HW^{N})^{2} + (1-NW^{N})^{2} + (1-R^{N})^{2}}$$

A3.2.2.1.Municipal Waste

Municipal waste contributes to several environmental problems including habitat destruction, surface and groundwater pollution and other forms of air, soil and water contamination. Depending on the disposal method, there may be other negative consequences, such as the creation of toxic substances through incineration. Landfills also emit methane (which contributes to global warming) and other gases.

$$MW^{\mathrm{N}}{}_{j} = 1 - \frac{MW_{j}}{\sqrt{\sum_{j=1}^{m} MW_{j}^{2}}}$$

A3.2.2.2.Hazardous Waste

Hazardous wastes are those substances that require special technologically advanced methods of disposal to render them harmless or less dangerous because of the threat they pose to human health and the environment. If disposed of without proper treatment, hazardous wastes can cause serious, long-lasting damage to both terrestrial and aquatic ecosystems. Human health impacts can also be severe. For example, long-term exposure to mercury, lead or cadmium can damage the brain, the kidneys, the nervous system and fetal development. Hazardous wastes are produced by manufacturing processes, the chemical industry, the petroleum industry and other industrial sectors.

Examples include acids, alkilis, solvents, medical waste, resins, sludge and heavy metals.

$$HW^{N}{}_{j} = 1 - \frac{HW_j}{\sqrt{\sum_{j=1}^{m} HW_j^2}}$$

A3.2.2.3.Nuclear Waste

In many countries of the EU25 there are many working or shut down reactors to produce energy. An inevitable byproduct of the process is spent fuel, the most common form of nuclear waste. Radioactive waste is also generated by uranium mining and milling, fuel enrichment, decontamination and decommissioning of nuclear facilities and other activities using isotopes, such as scientific research. Nuclear waste is a major threat to human health and the environment, and poses a difficult disposal problem. The dilemma about how to properly dispose of nuclear waste continues to plague the "nuclear industry" of every nation.

$$NW^{N}{}_{j} = 1 - \frac{NW_j}{\sqrt{\sum_{j=1}^{m} NW_j^2}}$$

A3.2.2.4.Recycling

The OECD defines recycling as the "reuse of material in a production process that diverts it from the waste stream". Recycling is an important activity because it reduces the amount of material being treated as waste, reduces energy requirements and relieves pressure on virgin sources of natural resources. Levels of recycling vary widely among different materials such as glass, metal, plastic, wood, paper and cardboard. Composting is an important means of diverting food and yard waste from the municipal waste stream. The environmental problems caused by municipal waste can be significantly alleviated through increased recycling, although reducing the amount of waste generated is a more effective and efficient strategy in the long run.

$$R^{\mathrm{N}}{}_{j} = 1 - \frac{R_j}{\sqrt{\sum_{j=1}^{m} R_j^2}}$$

A3.2.3. Land Use (LU)

The land use choices we make are the blueprint for our community's design. So a new vision of the future provides effective infrastructure that enables us to work, raise our families, and educate our children. Our land use supports our quality of life while protecting the environment. Community infrastructure attract several territorial actors (for business and for leisure) as well as high quality jobs. The region will foster sustainable development that meets the needs of present generations without impairing future generations' ability to meet their own needs.

A sustainable economy is essential to good land use planning and infrastructure provision. A respect for the environment helps maximize the use of land and infrastructure. Involved neighborhoods are essential for a thriving community. Smart land use and high quality infrastructure are essential if we are to achieve our vision of a robust economy, world-class education, and a safe community.

A protected area is a geographic region in which certain activities that cause ecological damage are restricted or prohibited. Originally created to promote recreation and tourism, protected areas are now viewed as critical wildlife conservation areas. The primary goals of protected areas are to maintain biodiversity, allow ecological processes to continue and provide recreational opportunities.

The variables that we can use for measure the contribution of Land use to the Environmental Quality (EQ) are:

green area per capita (GPA),

protected green area per capita(PGA),

artificial surface per capita (AS),

less favourite areas per capita (LFA), agricolture area per capita (AA);

Therefore the land use (LU) index will be:

$$\mathrm{LU} = \sqrt{(1-GPA^{N})^2 + (1-PGA^{N})^2 + (1-LFA^{N})^2 + (1-FA^{N})^2 + (1-GAA^{N})^2}$$

where

$$\mathrm{GPA^N}_j = \frac{GPA_j}{\sqrt{\sum_{j=1}^{m} GPA_j^2}} \qquad \mathrm{PGA^N}_j = \frac{PGA_j}{\sqrt{\sum_{j=1}^{m} PGA_j^2}} \qquad \mathrm{AS^N}_j = 1 - \frac{AS_j}{\sqrt{\sum_{j=1}^{m} AS_j^2}}$$

$$\mathrm{LFA^N}_j = 1 - \frac{LFA_j}{\sqrt{\sum_{j=1}^{m} LFA_j^2}} \qquad \mathrm{AA^N}_j = \frac{AA_j}{\sqrt{\sum_{j=1}^{m} AA_j^2}}$$

A3.3. Local Government Quality (LGQ)

The relationship between government and citizens is becoming increasingly complex. Policy decisions are taken at multiple levels of government. Many problems (e.g. environmental degradation, tax evasion, crime) must be addressed in a global and increasingly inter-related environment, requiring co-operation and agreement across regions, nations, or on a global basis.

In considering these challenges, governments increasingly realise that they will not be able to conduct and effectively implement policies, as good as they may be, if their citizens do not understand and support them. Thus, governments are looking to new or improved models and approaches for better informing and involving citizens in the policy-making process.

Variations in political participation between areas are conventionally explained by the different socio-economic make-up of localities: wealthier areas are expected to have higher levels of participation than more disadvantaged ones. However, it is widely recognised that this so called 'resource model' cannot explain all variations in participation. Nowadays this gap it's not the only reason of a potential low participation of citizen in local government. So it's necessary to indagate the other factors, other than socio-economic variables, that influence the level and style of participation in different areas and the level of citizen satisfaction of the local government services.

The level of public knowledge of local government, people's satisfaction with local service provision, public views and complaints about local services it's a good method to measure the level of quality of local government. In the past years the studies show that the level of public knowledge of local government was low and people did not complain about local government services although the level of satisfaction was low[6], but now the situation it’s changing.

The study of local government quality must analyse three aspects of strengthening relations between governments and citizens (considered as individuals and as groups):

Government information for citizens: how governments manage, disseminate and communicate information to ensure that citizens can obtain it, understand it, and make good use of it.

Government consultation with citizens in the development and implementation of public policies.

Government efforts to ensure active participation by citizens. Public participation can be seen as ranging from information-sharing to consultation to more active forms of participation, such as partnerships, that involve strong citizen influence over public policies and services. It is considered here in this most active sense

Level of local governement welfare structure

The quality of local governement will be function of:

Welfare structure (WS)

Partecipation (Ptc)

Use of economic resources (ERU)

[6] The belief that complaints would have no effect is the main reason for not complaining. The impact of sex, age, education, income, length of residence in the locality, housing tenure, and political opinion on public attitudes to local government is also assessed. Of these variables, age, education and income levels are found to be significant.

To define the value of the Local Government Quality we can use the following relation:

$$LGQ = \sqrt{WS_{LGQ}{}^2 + Pct_{LGQ}{}^2 + (1 - ERU_{LGQ})^2}$$

A3.3.1. Welfare structure (WS)

Cfr. Annex A3 Quality pag 65

A3.3.2. Participation (Ptc)

The citizen's participation can be measured trough these indicators:

rate of participation on voting (RPV)= average % of participation on voting
use of government web-site (WSA) = n° of access to the administratrations web-site
citizen Involvement rate in local government (CI)= The number of project that provide an opportunity for citizens to get informed , to express their opinion on key public issues and to really participate in the community life .

$$\mathrm{RPV^N}_j = \frac{RPV_j}{\sqrt{\sum_{j=1}^{m} RPV_j^2}} \qquad \mathrm{WSA^N}_j = \frac{WSA_j}{\sqrt{\sum_{j=1}^{m} WSA_j^2}} \qquad \mathrm{CI^N}_j = \frac{CI_j}{\sqrt{\sum_{j=1}^{m} CI_j^2}}$$

the participation (Ptc) index will be:

$$\mathrm{Ptc} = \sqrt{(1 - RPV^N)^2 + (1 - WSA^N)^2 + (1 - CI^N)^2}$$

A3.3.3. Use of economic resources (ERU)

$$\mathrm{ERU^N}_j = \frac{ERU_j}{\sqrt{\sum_{j=1}^{m} ERU_j^2}}$$

A4. USE OF RESOURCES AND FUNDS

<table>
<tr><td rowspan="16">VULNERABILITY</td><td rowspan="16">Use of resources and funds</td><td rowspan="2">Economic resources</td><td>Use of structural funds (cfr. Espon project)</td><td></td><td>n° of financing projects, distributed funds, % of co-financing (with national and european funds)</td></tr>
<tr><td>World Economic Forum Competitiveness index</td><td></td><td></td></tr>
<tr><td rowspan="4">Human resources</td><td>HDI (Human development Index)</td><td></td><td></td></tr>
<tr><td>human capital (employment)</td><td></td><td>unemployment long-term rate, vacancies, employment rate, employment in medium-high and high-tech manufacturing, employment in high-tech services, employment in R&D, employees with tertiary level education working in a science and technology occupation (HRSTC)</td></tr>
<tr><td>productivity</td><td></td><td>labour productivity per hour worked, unity labour cost growth , average age of retirement</td></tr>
<tr><td>Cohesion</td><td>Cohesion Index (cfr ESPON zoom project)</td><td></td></tr>
<tr><td rowspan="4">Natural resources</td><td>safeguard</td><td></td><td>biodiversity index, world heritage list, world heritage sites</td></tr>
<tr><td>consumption</td><td></td><td>energy intensity of economy</td></tr>
<tr><td>production</td><td></td><td>pollution (air, water, soil), waste</td></tr>
<tr><td>Sustainability</td><td>ESI - Environmental Sustainability Index 2005</td><td></td></tr>
<tr><td rowspan="4">Resource for the innovation</td><td rowspan="4">SII - Summary Innovation Index cfr. EIS 2004</td><td>Human resources</td><td>S&E graduates / 20-29 years, Population with tertiary education, Participation in lifelong learning, Employment in med/high-tech manufacturing, Employment in high-tech services,</td></tr>
<tr><td>Knowledge creation</td><td>Public R&D / GDP, Business R&D / GDP, High-tech EPO patents / population, High-tech USPTO patents / population, EPO patents / population, USPTO patents / population,</td></tr>
<tr><td>Transmission and diffusion of knowledge</td><td>SMEs innovating in-house, SMEs involved in innovation co-operation, Innovation expenditures / turnover, SMEs being non-technical innovators,</td></tr>
<tr><td>Innovation finance, output and markets</td><td>High-tech venture capital share, Early stage venture capital / GDP, Sales ‘new to market’ products / turnover, Sales ‘new to firm’ products / turnover, Composite indicator on Internet access, ICT expenditures / GDP, High-tech manufacturing value-added share</td></tr>
</table>

If the three determinants examined carry to the definition of the *status quo*, the vulnerability measured by the Use of resources and funds is the determinant that measure the interactions of the variable ones of flow with those of state.

This determinant are calculated using 4 typologies:

Economic resources (ER_{use})
Human resources (HR_{use})
Natural resources (NR_{use})
Resource for the innovation (SII)

And according to the methodology

$$R\&F_{use} = \sqrt{ER_{use}^{2} + HR_{use}^{2} + NR_{use}^{2} + (1 - SII^{N})^{2}}$$

A4.1. Economic resources (ER use)

The use of economic resources has direct and indirect effects on the economy and the society of a territory. The economic resources are fundamental in order to guarantee a harmonious development of the territories, under the aspect of infrastructures and under the social aspect.
This typologies want to measure the effect of the use of economic resources on the countries development and their capability to be competitive.
this typology we will be function of:

- Use of structural funds (SFU);
- World Economic Forum Competitiveness index (CompI)

To define the value of the typology (Economic resources) we can use the following relation

$$ER_{USE} = \sqrt{SFU^{2} + CompI^{N\,2}}$$

A4.1.1. Use of structural funds (SFU)

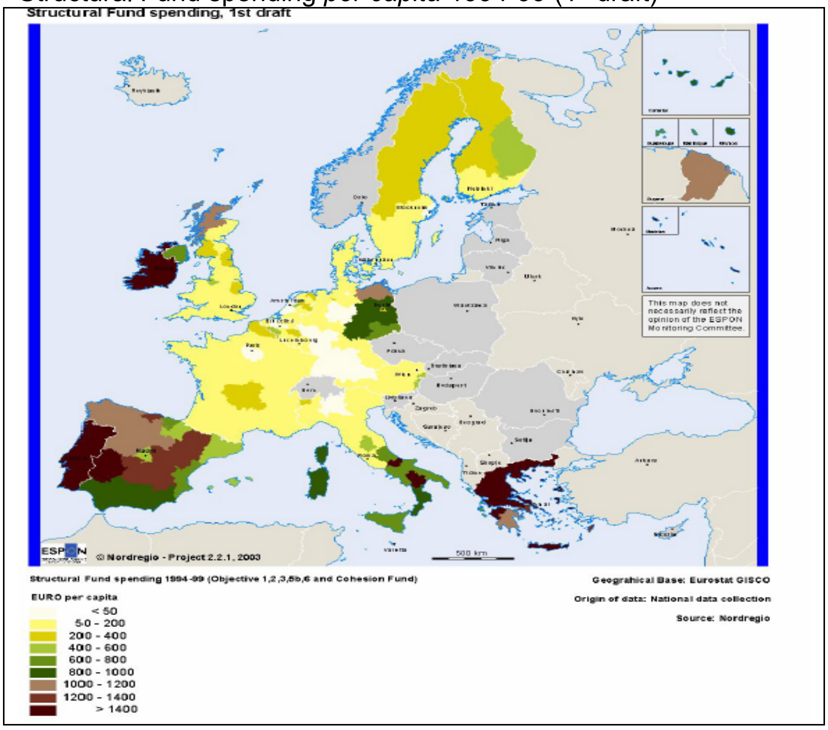
We measure the level of the impact of structural funds on the UE Countries using the results of the ESPON 2.2.1 project: Spending Structural Funds per capita (SF), Economic Growth (EcGr), Structural Funds expenditure as share of GDP ($Sfexp_{\%GDP}$), Population Change (PC), Structural Fund expenditure (SFexp).

Therefore according to the methodology a synthetic index of the contribution of the Structural Funds to the good use of the economic resources (SFU) will be:

$$SFU = \sqrt{(1-SF^{N})^{2}+(1-EcGr^{N})^{2}+(1-SF\exp_{\%GDP}{}^{N})^{2}+(1-PC^{N})^{2}+(1-Emp^{N})^{2}+(1-SF\exp)^{2}}$$

Spending Structural Fund per capita (SF)

Structural Fund spending *per capita* 1994-99 (1st draft)



Starting by the results of ESPON 2.2.1 project we can change the classes of values attributed by the project in the following values. We attribute the value:

1 to the class <500
2 to the class 50-200
3 to the class 200-400
4 to the class 400-600
5 to the class 600-800
6 to the class 800-1000
7 to the class1000-1200
8 to the class 1200-1400

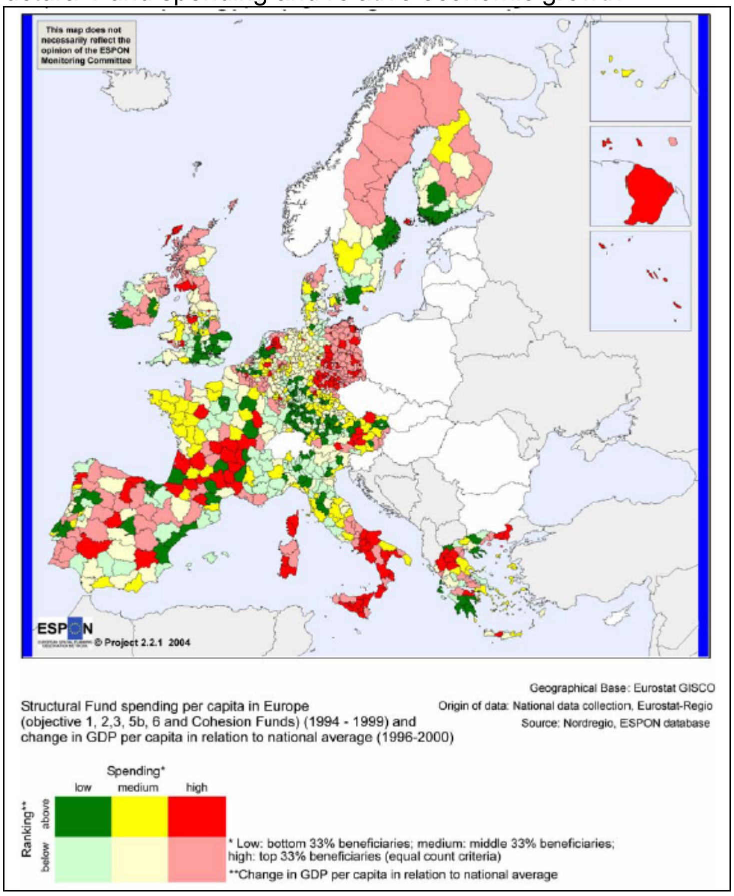
9 to the class > 1400

So the *Spending Structural Funds per capita index* will be:

$$\mathrm{SF^N}_j = \frac{SF_j}{\sqrt{\sum_{j=1}^{m} SF_{SC\,j}^{\;2}}}$$

Economic Growth (EcGr)

Structural Fund spending and relative economic growth



Starting by the results of ESPON 2.2.1 project we can change the classes of values attributed by the project in the following values. We attribute the value:

6 to the red class

5 to the yellow class

4 to the green class

3 to the pink class

2 to the clear yellow class

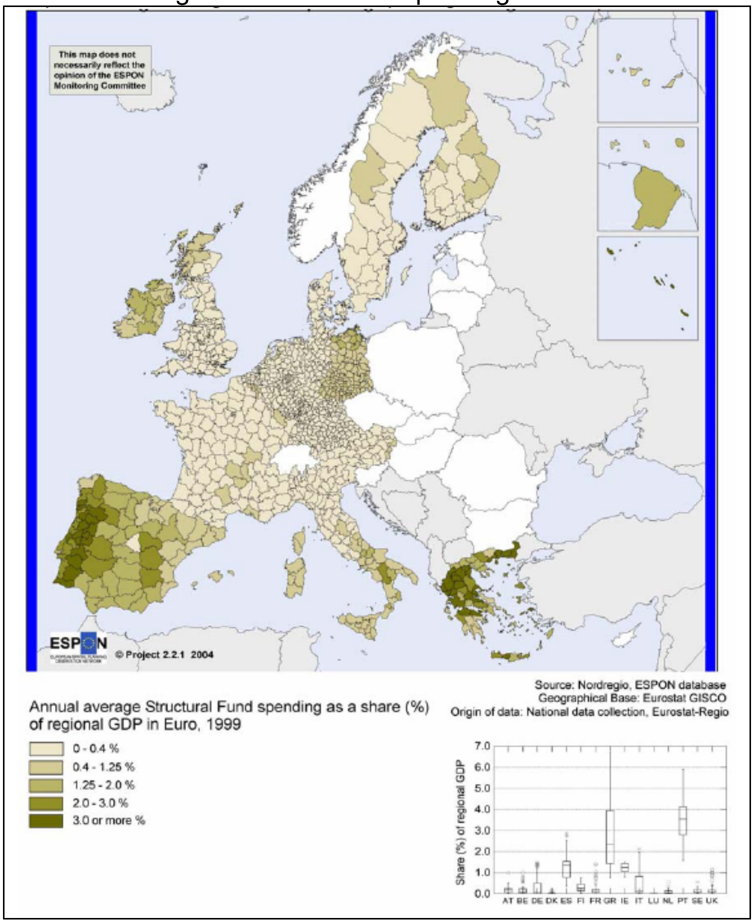
1 to the clear green class

An index that measures the relationship between the structural funds expenditure and economic growth are:

$$\mathrm{EcGr}^{\mathrm{N}}{}_{j} = \frac{EcGr_{j}}{\sqrt{\sum_{j=1}^{m} EcGr_{j}^{2}}}$$

Structural Fund spending as a share of GDP ($\mathrm{Sfexp}_{\%\mathrm{GDP}}$)

Annual average Structural Fund spending as a share of GDP in 1999



Starting by the results of ESPON 2.2.1 project we can change the classes of values attributed by the project in the following values. We attribute the value:

1 to the class 0-0.4%

2 to the class 0.4-1.25%

3 to the class 1.25-2.0%

4 to the class 2.0-3.0%

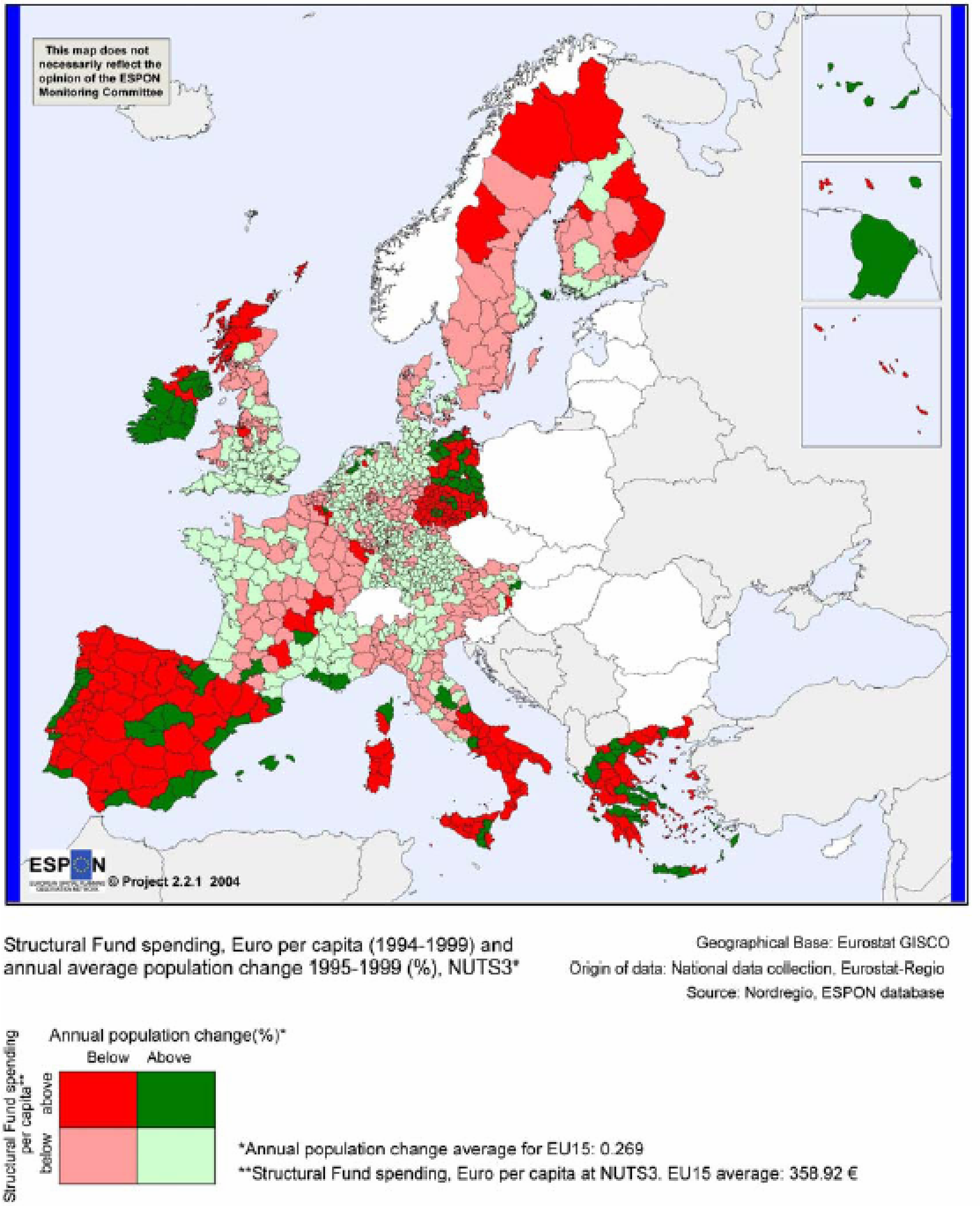
5 to the class 3.0 or more %

The measure of expenditure of SF in % of the GDP is:

$$\mathrm{SFexp}_{\%GDP}{}^{N}{}_{j} = \frac{SF\exp_{\%GDP\,j}}{\sqrt{\sum_{j=1}^{m} SF\exp_{\%GDP\,j}^{2}}}$$

Population change (PC)

Structural Fund spending *per capita* and annual average population change



Starting by the results of ESPON 2.2.1 project we can change the classes of values attributed by the project in the following values. We attribute the value:

4 to the green class

3 to the red class

2 to the clear green class

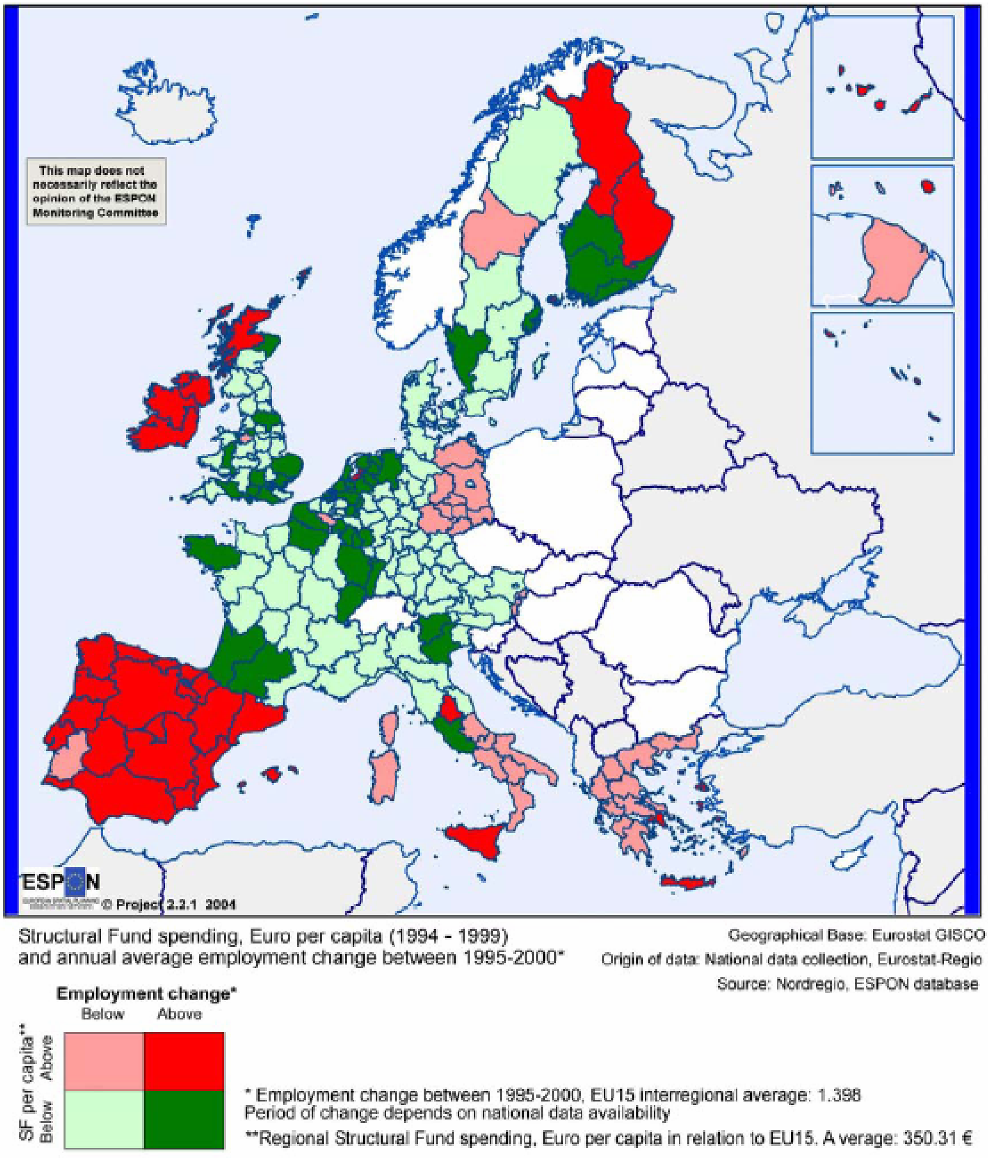
4 to the pink class

An index that considerate the relationship of Structural Fund spending per capita and annual average population change are:

$$\mathrm{PC}^{\mathrm{N}}{}_{j} = \frac{PC_j}{\sqrt{\sum_{j=1}^{m} PC_j^2}}$$

Employment change (Emp)

Structural Fund spending *per capita* and annual average change in employment



Starting by the results of ESPON 2.2.1 project we can change the classes of values attributed by the project in the following values. We attribute the value:

4 to the red class

3 to the pink class

2 to the green class

1 to the clear green class

An index that considerate the relationship of Structural Fund spending per capita and annual average change in employment are:

$$Emp^{N}_{j} = \frac{Emp_{j}}{\sqrt{\sum_{j=1}^{m} Emp_{j}^{2}}}$$

Structural Funds expenditure (SFexp)

According with the 3rd Choesion Report the contribution of Structural Funds to improving the state of UE countries, will be divided in expenditure by region objective 1 $(SF_{\exp^{Ob1}})$ and non-objective 1 $(1-SF_{\exp^{non-Ob1}})$, so the total structural funds expenditure (Ob.1 +non-Ob.1) will be:

$$\mathrm{SF}_{\exp^1} = \sqrt{(1-(SF_{\exp^{Ob1}})^2 + (1-SF_{\exp^{non-Ob1}})^2}$$

1st Step: Objective 1 Regions $(SF_{\exp^{Ob1}})$

A4.4 Objective 1: Indicative breakdown of Structural Funds by category of expenditure, 2000-2006

	BE	DK	DE	EL	ES	FR	IE	IT	LU	NL	AT	PT	FI	SE	UK	Total EU	Total by category
																EUR million	%
Productive environment	**368**	**0**	**8041**	**4587**	**10693**	**1298**	**910**	**9838**	**0**	**57**	**190**	**6368**	**596**	**457**	**2500**	**45903**	**33.8**
Agriculture	30	0	869	985	1543	244	122	1609	0	1	17	1165	83	72	135	6874	5.1
Forestry	3	0	98	127	884	55	32	249	0	0	5	391	23	6	33	1905	1.4
Rural development	8	0	2343	1099	2328	380	42	1552	0	11	14	773	80	53	205	8892	6.5
Fisheries	2	0	0	293	0	68	99	185	0	6	1	210	6	11	102	984	0.7
Assistance to large businesses	38	0	602	133	1084	80	0	235	0	3	23	123	75	0	157	2553	1.9
Assistance to SMEs & craft	152	0	2370	953	2368	231	306	2103	0	22	76	2638	201	179	1248	12849	9.5
Tourism	40	0	235	585	546	152	56	1404	0	8	36	389	8	42	206	3706	2.7
RTD	96	0	1524	410	1940	87	252	2501	0	6	19	678	119	94	412	8138	6.0
Human resources	**190**	**0**	**5902**	**3975**	**8858**	**1237**	**844**	**4005**	**0**	**31**	**48**	**3868**	**259**	**149**	**2014**	**31378**	**23.1**
Labour market policy	4	0	1994	766	4162	99	50	1140	0	17	29	397	67	13	493	9231	6.8
Social inclusion	27	0	1218	729	531	206	210	208	0	11	3	673	19	18	384	4237	3.1
Positive labour market action for women	0	0	546	345	240	25	10	384	0	1	2	51	19	19	96	1737	1.3
Education & vocational training	61	0	935	1411	1248	787	409	1552	0	1	1	2473	65	21	510	9473	7.0
Entrepreneurship	99	0	1209	724	2678	120	165	722	0	3	12	273	89	77	530	6701	4.9
Infrastructure	**62**	**0**	**5664**	**11841**	**18363**	**1216**	**1319**	**7470**	**0**	**30**	**16**	**8433**	**44**	**102**	**1608**	**56169**	**41.3**
Transport	9	0	3102	6497	9128	439	954	3134	0	3	0	3211	11	33	465	26986	19.8
Telecommunication & information society	6	0	177	1496	802	94	104	1103	0	7	8	496	11	56	363	4723	3.5
Environment	43	0	2373	2190	6405	451	218	2721	0	18	4	2429	7	6	569	17433	12.8
Energy	5	0	11	411	287	43	44	289	0	1	4	469	7	3	109	1663	1.2
Social & health	0	0	0	1247	1740	189	0	243	0	3	0	1827	8	4	102	5363	3.9
Other	**5**	**0**	**353**	**559**	**182**	**54**	**15**	**809**	**0**	**3**	**7**	**360**	**14**	**14**	**130**	**2504**	**1.8**
TOTAL	**625**	**0**	**19959**	**20961**	**38096**	**3805**	**3088**	**22122**	**0**	**123**	**261**	**19029**	**913**	**722**	**6252**	**135955**	**100.0**
Share of total Obj. 1 allocation (%)	0.5	0.0	14.7	15.4	28.0	2.8	2.3	16.3	0	0.1	0.7	0.2	0.5	4.6	14.0	100.0	

Source: DG REGIO

Breakdown of structural Funds by category of expenditure (index) (Ob.1):

- Productive environment (PE_{SF})
- Human resources (HR_{SF})
- Infrastructure (I_{SF})
- Other (O_{SF})

$$PE_{SF_j}^{N} = \frac{PE_{SF_j}}{\sqrt{\sum_{j=1}^{m} PE_{SF_j}^{2}}} \qquad HR_{SF_j}^{N} = \frac{HR_{SF_j}}{\sqrt{\sum_{j=1}^{m} HR_{SF_j}^{2}}} \qquad I_{SF_j}^{N} = \frac{I_{SF_j}}{\sqrt{\sum_{j=1}^{m} I_{SF_j}^{2}}} \qquad O_{SF_j}^{N} = \frac{O_{SF_j}}{\sqrt{\sum_{j=1}^{m} O_{SF_j}^{2}}}$$

the Structural funds expenditure index (Ob.1) will be:

$$SF_{\exp^{Ob1}} = \sqrt{(1-PE_{SF}{}^{N})^2 + (1-HR_{SF}{}^{N})^2 + (1-I_{SF}{}^{N})^2 + (1-O_{SF}{}^{N})^2}$$

2nd Step: Region non-Objective 1 $(1-SF_{\exp^{non-Ob1}})$

A4.9 Non-Objective 1: Indicative breakdown of Structural Funds by category of expenditure, 2000-2006

	BE	DK	DE	EL	ES	FR	IE	IT	LU	NL	AT	PT	FI	SE	UK	Total EU	Total by category
																EUR million	%
Productive environment	**451**	**153**	**2806**	**294**	**2177**	**3361**	**70**	**1605**	**21**	**573**	**770**	**309**	**442**	**414**	**3469**	**16913**	**29.1**
Agriculture	29	0	28	45	30	42	3	18	0	0	3	26	11	12	0	246	0.4
Forestry	28	0	3	3	17	13	1	5	0	0	1	9	3	1	0	83	0.1
Rural development	14	25	317	144	560	443	51	247	2	187	84	182	71	63	211	2601	4.5
Fisheries	3	0	0	8	0	18	2	3	0	1	0	5	1	2	5	46	0.1
Assistance to large businesses	41	11	158	3	58	196	0	9	3	7	147	3	10	2	13	662	1.1
Assistance to SMEs & craft	159	39	1489	50	621	1324	7	867	3	265	265	60	202	222	2884	8456	14.6
Tourism	103	43	344	30	58	785	1	328	3	92	137	9	40	56	139	2168	3.7
RTD	73	35	467	11	832	511	6	104	10	21	132	15	103	56	219	2594	4.5
Other	0	0	0	0	0	30	0	25	0	0	0	0	0	0	0	53	0.1
Human resources	**683**	**597**	**5700**	**206**	**3280**	**5831**	**53**	**4367**	**46**	**2149**	**710**	**204**	**594**	**902**	**5641**	**30963**	**53.3**
Labour market policy	165	235	2387	45	1025	1074	7	1429	18	808	264	10	149	193	1269	9075	15.6
Social inclusion	222	142	1145	30	441	1496	14	266	15	745	140	53	81	146	1634	6571	11.3
Positive labour market action for women	108	0	581	20	298	342	2	451	2	21	83	19	41	63	366	2398	4.1
Education & vocational training	84	54	542	48	216	1545	18	1191	5	505	102	60	136	152	1418	6076	10.5
Entrepreneurship	105	166	1046	63	1300	1373	11	1030	6	71	121	62	187	349	954	6843	11.8
Infrastructure	**225**	**41**	**998**	**327**	**1523**	**2259**	**32**	**1113**	**24**	**340**	**69**	**203**	**130**	**136**	**779**	**8198**	**14.1**
Transport	22	5	191	169	501	593	21	251	1	38	8	73	29	52	82	2037	3.5
Telecommunication & information society	94	20	74	40	68	287	3	98	1	58	15	11	32	40	165	1006	1.7
Environment	73	8	662	68	792	1123	7	696	16	228	29	60	65	35	478	4343	7.5
Energy	7	4	34	14	32	70	1	28	5	0	11	11	2	4	8	229	0.4
Social & health	9	3	15	36	130	72	0	40	0	15	6	46	1	6	45	424	0.7
Other	21	0	22	0	0	114	0	0	0	0	0	2	0	0	0	159	0.3
Other	**55**	**32**	**334**	**32**	**61**	**414**	**4**	**429**	**2**	**38**	**38**	**18**	**42**	**49**	**435**	**1981**	**3.4**
TOTAL	**1414**	**822**	**9838**	**858**	**7041**	**11864**	**159**	**7514**	**92**	**3101**	**1587**	**733**	**1208**	**1501**	**10324**	**58055**	**100.0**
Share of total non-Obj. 1 allocation (%)	2.4	1.4	16.9	1.5	12.1	20.4	0.3	12.9	0.2	5.3	2.7	1.3	2.1	2.6	17.8	100.0	

Source: DG REGIO

Breakdown of structural Funds by category of expenditure (index) (non-Ob.1):

- Productive environment (PE_{SF})
- Human resources (HR_{SF})
- Infrastructure (I_{SF})
- Other (O_{SF})

$$PE_{SF_j}^{N} = \frac{PE_{SF_j}}{\sqrt{\sum_{j=1}^{m} PE_{SF_j}^{2}}} \qquad HR_{SF_j}^{N} = \frac{HR_{SF_j}}{\sqrt{\sum_{j=1}^{m} HR_{SF_j}^{2}}} \qquad I_{SF_j}^{N} = \frac{I_{SF_j}}{\sqrt{\sum_{j=1}^{m} I_{SF_j}^{2}}} \qquad O_{SF_j}^{N} = \frac{O_{SF_j}}{\sqrt{\sum_{j=1}^{m} O_{SF_j}^{2}}}$$

the Structural funds expenditure index (non-Ob.1) will be:

$$SF_{\exp^{no-Ob1}} = \sqrt{(1-PE_{SF}{}^{N})^2 + (1-HR_{SF}{}^{N})^2 + (1-I_{SF}{}^{n})^2 + (1-O_{SF}{}^{N})^2}$$

A4.2.2 World Economic Forum Competitiveness index (CompI)

The Growth Competitiveness Index is composed of three component indexes:

- **the technology index,**
- **the public institutions index,**
- **and the macroeconomic environment index.**

The results of this study lead to a classification of countries in order to their competitiveness:

Country	GCI 2004 rank	GCI 2004 score	GCI 2003 rank*
Finland	1	5.95	1
United States	2	5.82	2
Sweden	3	5.72	3
Taiwan	4	5.69	5
Denmark	5	5.66	4
Norway	6	5.56	9
Singapore	7	5.56	6
Switzerland	8	5.49	7
Japan	9	5.48	11
Iceland	10	5.44	8
United Kingdom	11	5.30	15
Netherlands	12	5.30	12
Germany	13	5.28	13
Australia	14	5.25	10
Canada	15	5.23	16
United Arab Emirates	16	5.21	—
Austria	17	5.20	17
New Zealand	18	5.18	14
Israel	19	5.09	20
Estonia	20	5.08	22
Hong Kong SAR	21	5.06	24
Chile	22	5.01	28
Spain	23	5.00	23
Portugal	24	4.96	25
Belgium	25	4.95	27
Luxembourg	26	4.95	21
France	27	4.92	26
Bahrain	28	4.91	—
Korea	29	4.90	18
Ireland	30	4.90	30
Malaysia	31	4.88	29
Malta	32	4.79	19
Slovenia	33	4.75	31
Thailand	34	4.58	32
Jordan	35	4.58	34
Lithuania	36	4.57	40
Greece	37	4.56	35
Cyprus	38	4.56	—
Hungary	39	4.56	33
Czech Republic	40	4.55	39
South Africa	41	4.53	42
Tunisia	42	4.51	38
Slovak Republic	43	4.43	43
Latvia	44	4.43	37
Botswana	45	4.30	36
China	46	4.29	44
Italy	47	4.27	41
Mexico	48	4.17	47
Mauritius	49	4.14	46
Costa Rica	50	4.12	51
Trinidad and Tobago	51	4.12	49
Namibia	52	4.11	52
El Salvador	53	4.10	48
Uruguay	54	4.08	50
India	55	4.07	56
Morocco	56	4.06	61
Brazil	57	4.05	54
Panama	58	4.01	59
Bulgaria	59	3.98	64
Poland	60	3.98	45
Croatia	61	3.94	53
Egypt	62	3.88	58

(cont'd.)

Country	GCI 2004 rank	GCI 2004 score	GCI 2003 rank*
Romania	63	3.86	75
Colombia	64	3.84	63
Jamaica	65	3.82	67
Turkey	66	3.82	65
Peru	67	3.78	57
Ghana	68	3.78	71
Indonesia	69	3.72	72
Russian Federation	70	3.68	70
Algeria	71	3.67	74
Dominican Republic	72	3.63	62
Sri Lanka	73	3.57	68
Argentina	74	3.54	78
Gambia	75	3.52	55
Philippines	76	3.51	66
Vietnam	77	3.47	60
Kenya	78	3.45	83
Uganda	79	3.41	80
Guatemala	80	3.38	89
Bosnia and Hercegovina	81	3.38	—
Tanzania	82	3.38	69
Zambia	83	3.36	88
Macedonia, FYR	84	3.34	81
Venezuela	85	3.30	82
Ukraine	86	3.27	84
Malawi	87	3.24	76
Mali	88	3.24	99
Serbia and Montenegro	89	3.23	77
Ecuador	90	3.18	86
Pakistan	91	3.17	73
Mozambique	92	3.17	93
Nigeria	93	3.16	87
Georgia	94	3.14	—
Nicaragua	95	3.12	90
Madagascar	96	3.11	96
Honduras	97	3.10	94
Bolivia	98	3.09	85
Zimbabwe	99	3.03	97
Paraguay	100	2.99	95
Ethiopia	101	2.93	92
Bangladesh	102	2.84	98
Angola	103	2.72	100
Chad	104	2.50	101

* Note that these are the published rankings from 2003. The three countries not covered this year (Cameroon, Haiti, and Senegal) are not shown.

We can normalize the result of the World Economic Forum Competitiveness index using the standard formula:

$$\mathrm{CompI}_j^N = \frac{Comp_j}{\sqrt{\sum_{j=1}^{m} Comp_j^2}}$$

A4.2. Human resources (HRuse)

This typology is calculated using 4 sectors:

- Human development Index (HDI)
- human capital – employment (HCemp)
- productivity (HC prod)
- Cohesion (Coes)

In according to the methodology the human resources index will be:

$$\mathrm{HR}_{USE} = \sqrt{(1 - HDI^{N})^2 + {HC_{emp}^{N}}^2 + (1 - HC_{prod})^2 + Coes^2}$$

A4.2.1. Human development

The HDI (Human development Index) is elaborated by Union Nations Development Programme and we can be used (normalizating) to make a comparison between the territorial:

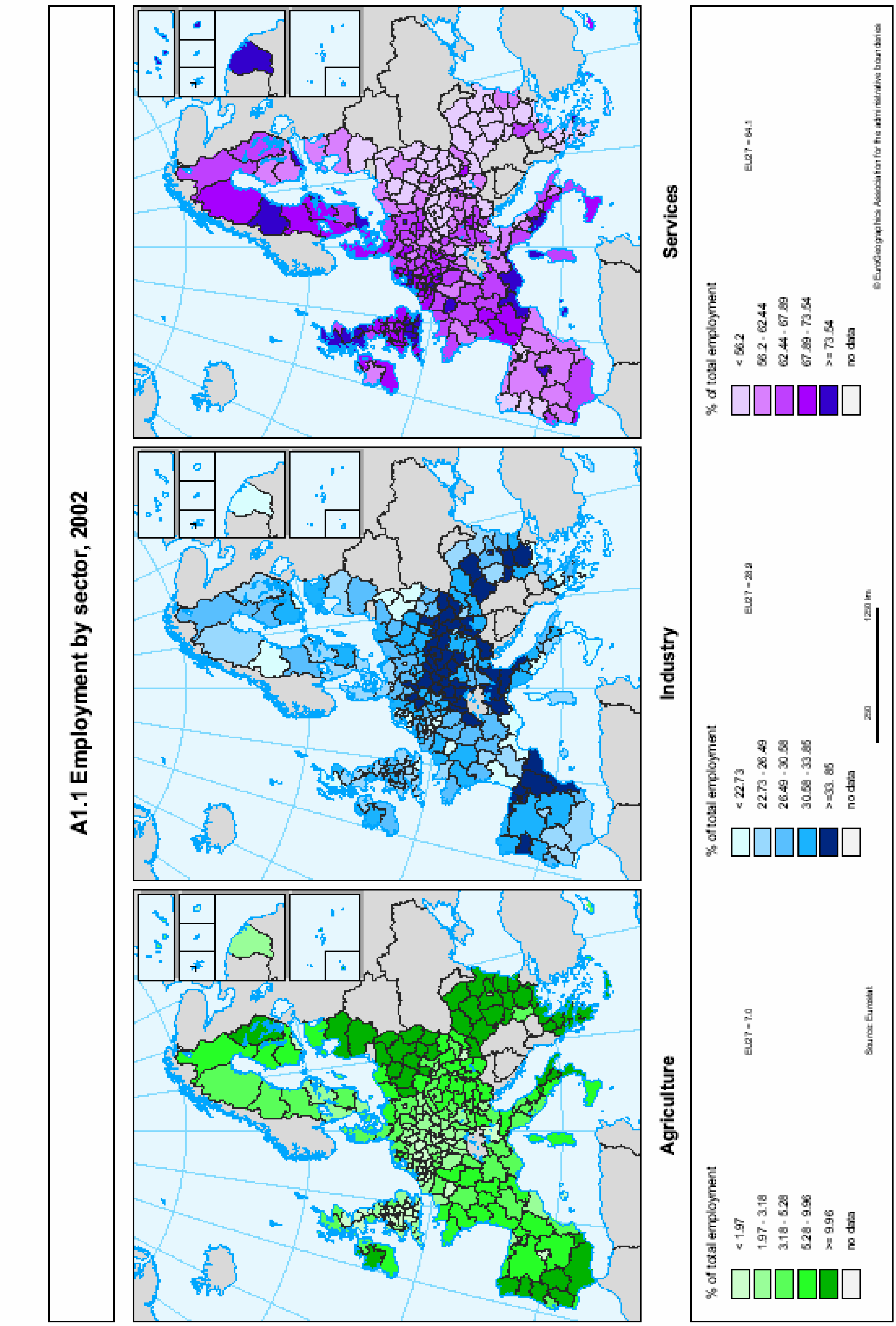
$$\mathrm{HDI}^{\mathrm{N}}{}_{j} = \frac{HDI_j}{\sqrt{\sum_{j=1}^{m} HDI_j^2}}$$

1 Human development index

HDI rank [a]		Life expectancy at birth (years) 2002	Adult literacy rate (% ages 15 and above) 2002 [b]	Combined gross enrolment ratio for primary, secondary and tertiary schools (%) 2001/02 [c]	GDP per capita (PPP US$) 2002	Life expectancy index	Education index	GDP index	Human development index (HDI) value 2002	GDP per capita (PPP US$) rank minus HDI rank [d]
High human development										
1	Norway	78.9	.. [e]	98 [f]	36,600	0.90	0.99	0.99	0.956	1
2	Sweden	80.0	.. [e]	114 [g, h]	26,050	0.92	0.99	0.93	0.946	19
3	Australia	79.1	.. [e]	113 [g, h]	28,260	0.90	0.99	0.94	0.946	9
4	Canada	79.3	.. [e]	95 [f]	29,480	0.90	0.98	0.95	0.943	5
5	Netherlands	78.3	.. [e]	99 [f]	29,100	0.89	0.99	0.95	0.942	6
6	Belgium	78.7	.. [e]	111 [f, g]	27,570	0.90	0.99	0.94	0.942	7
7	Iceland	79.7	.. [e]	90 [f]	29,750	0.91	0.96	0.95	0.941	1
8	United States	77.0	.. [e]	92 [h]	35,750	0.87	0.97	0.98	0.939	-4
9	Japan	81.5	.. [e]	84 [h]	26,940	0.94	0.94	0.93	0.938	6
10	Ireland	76.9	.. [e]	90 [f]	36,360	0.86	0.96	0.98	0.936	-7
11	Switzerland	79.1	.. [e]	88 [f]	30,010	0.90	0.95	0.95	0.936	-4
12	United Kingdom	78.1	.. [e]	113 [f, g]	26,150	0.88	0.99	0.93	0.936	8
13	Finland	77.9	.. [e]	106 [f, g]	26,190	0.88	0.99	0.93	0.935	6
14	Austria	78.5	.. [e]	91 [f]	29,220	0.89	0.96	0.95	0.934	-4
15	Luxembourg	78.3	.. [e]	75 [f, i]	61,190 [i]	0.89	0.91	1.00	0.933	-14
16	France	78.9	.. [e]	91 [f]	26,920	0.90	0.96	0.93	0.932	0
17	Denmark	76.6	.. [e]	96 [f]	30,940	0.86	0.98	0.96	0.932	-12
18	New Zealand	78.2	.. [e]	101 [g, h]	21,740	0.89	0.99	0.90	0.926	6
19	Germany	78.2	.. [e]	88 [h]	27,100	0.89	0.95	0.94	0.925	-5
20	Spain	79.2	97.7 [e, j, k]	92 [h]	21,460	0.90	0.97	0.90	0.922	5
21	Italy	78.7	98.5 [e, j, k]	82 [f]	26,430	0.89	0.93	0.93	0.920	-3
22	Israel	79.1	95.3	92	19,530	0.90	0.94	0.88	0.908	5
23	Hong Kong, China (SAR)	79.9	93.5 [j, k]	72	26,910	0.91	0.86	0.93	0.903	-6
24	Greece	78.2	97.3 [e, j, k]	86 [f]	18,720	0.89	0.95	0.87	0.902	5
25	Singapore	78.0	92.5 [l]	87 [m]	24,040	0.88	0.91	0.92	0.902	-3
26	Portugal	76.1	92.5 [e, j, k]	93 [f]	18,280	0.85	0.97	0.87	0.897	6
27	Slovenia	76.2	99.7 [e]	90 [f]	18,540	0.85	0.96	0.87	0.895	3
28	Korea, Rep. of	75.4	97.9 [e, j, k]	92 [h]	16,950	0.84	0.97	0.86	0.888	9
29	Barbados	77.1	99.7 [j, n]	88 [f]	15,290	0.87	0.95	0.84	0.888	11
30	Cyprus	78.2	96.8 [l]	74 [f]	18,360 [f]	0.89	0.89	0.87	0.883	1
31	Malta	78.3	92.6	77 [f]	17,640	0.89	0.87	0.86	0.875	3
32	Czech Republic	75.3	.. [e]	78 [h]	15,780	0.84	0.92	0.84	0.868	7
33	Brunei Darussalam	76.2	93.9 [l]	73	19,210 [f, o]	0.85	0.87	0.88	0.867	-5
34	Argentina	74.1	97.0	94 [h]	10,880	0.82	0.96	0.78	0.853	14
35	Seychelles	72.7 [m]	91.9 [l]	85	18,232 [p, q]	0.80	0.90	0.87	0.853	-2
36	Estonia	71.6	99.8 [e, l]	96 [f]	12,260	0.78	0.98	0.80	0.853	10
37	Poland	73.8	99.7 [e, j, k]	90 [h]	10,560	0.81	0.96	0.78	0.850	13
38	Hungary	71.7	99.3 [e, j, k]	86 [h]	13,400	0.78	0.95	0.82	0.848	3
39	Saint Kitts and Nevis	70.0 [r]	97.8 [r]	97 [f]	12,420	0.75	0.98	0.80	0.844	6
40	Bahrain	73.9	88.5	79	17,170	0.81	0.85	0.86	0.843	-4
41	Lithuania	72.5	99.6 [e, l]	90 [f]	10,320	0.79	0.96	0.77	0.842	10
42	Slovakia	73.6	99.7 [e, l]	74 [h]	12,840	0.81	0.91	0.81	0.842	1
43	Chile	76.0	95.7 [l]	79 [f]	9,820	0.85	0.90	0.77	0.839	11
44	Kuwait	76.5	82.9	76 [f]	16,240 [q]	0.86	0.81	0.85	0.838	-6
45	Costa Rica	78.0	95.8	69	8,840 [q]	0.88	0.87	0.75	0.834	14
46	Uruguay	75.2	97.7	85 [h]	7,830	0.84	0.94	0.73	0.833	16
47	Qatar	72.0	84.2 [j, l]	82	19,844 [f, s]	0.78	0.83	0.88	0.833	-21
48	Croatia	74.1	98.1 [l]	73	10,240	0.82	0.90	0.77	0.830	4
49	United Arab Emirates	74.6	77.3	68	22,420 [f, q]	0.83	0.74	0.90	0.824	-26
50	Latvia	70.9	99.7 [e, l]	87 [f]	9,210	0.76	0.95	0.75	0.823	6

A4.2.2. Human capital employment (HC emp)

In according to what is said in the 3rd Cohesion Report we can value the contribution of the employment rate on every macro-economic sector. Agriculture, industries and servicies.



Starting by the results of ESPON 2.2.1 project we can change the classes of values attributed by the project in the following values. We attribute the value:

Agriculture	Industry	Services
1 to <1.97%	1 to <22.73%	1 to <56.2%
2 to 1.97-3.18%	2 to 22.73-26.49%	2 to 56.2-62.44%
3 to 3.18-5.28%	3 to 26.49-30.58%	3 to 62.44-67.89%
4 to 5.28-9.96%	4 to 30.58-33.85%	4 to 67.89-73.54%
5 to more 9.96%	5 to > 33.85%	5 to > 73.54%

Employment in agriculture index	Employment in industry index	Employment in service index
$\mathrm{Emp}_{Ag\,j}^{\;N} = \dfrac{Emp_{Ag\,j}}{\sqrt{\sum_{j=1}^{m} Emp_{Ag\,j}^{\;2}}}$	$\mathrm{Emp}_{Ind\,j}^{\;N} = \dfrac{Emp_{Ind\,j}}{\sqrt{\sum_{j=1}^{m} Emp_{Ind\,j}^{\;2}}}$	$\mathrm{Emp}_{Serr\,j}^{\;N} = \dfrac{Emp_{Ser\,j}}{\sqrt{\sum_{j=1}^{m} Emp_{Ser\,j}^{\;2}}}$

the Human capital employment index will be:

$$\mathrm{HC}_{Emp} = \sqrt{(1 - Emp_{Ag}^{\;N})^2 + (1 - Emp_{Ind}^{\;N})^2 + (1 - Emp_{Ser}^{\;N})^2}$$

A4.2.3. Productivity **(**to be developed**)** **(HC_{prod})**

A4.2.4. Cohesion (Coes)

A central aim of the EU, as set out in the Treaty (Article2) is 'to promote economic and social progress and a high level of employment and to achieve balanced and sustainable development, in particular through the creation of an area without internal frontiers, through the strengthening of economic and social cohesion and through the establishment of economic and monetary union...'.

In according to the 3rd Cohesion Report we can identified same potential priorities or line of intervention to improve in the economic and social cohesion:

Innovation and the knowledge based economy: Regional innovation systems (stimulation of business networks, SME cooperation especially with Universities and technology centres, advance business centres, technology audits, technology forecasting, clusters policy etc.) and entrepreneurship (diversification, business planning, incubators, spin outs of technology based companies).

Accessibility and services of general economic interest: Helping in particular areas with geographical handicaps (e.g. mountains, islands and sparsely populated areas) with broadband communications and mobile telephone infrastructure to achieve a universal service; secondary transport networks (i.e. securing for isolated areas secondary access to the EU's main framework of transport routes), services of general interest, transport, and telephone services, and social infrastructure.

Environment and risk prevention: Renewable energies: biomass/hydro/solar energies. Environmental transport modes, urban transport and multi-modality, sewage treatment and water treatment, the regeneration of brown field sites, and the prevention of natural or technological disasters.

Education, employment and social support: Employability and social inclusion: equal opportunities and life-long learning for those regions most affected.

Human capital and labour supply: The focus here is on continuing training measures, active labour market measures to ensure access to the labour market for all and social inclusion support measures.

According to the 3rd Cohesion Raport we can identifying:

Economic Cohesion	**Social Cohesion**
It's a measure of : • Convergence of GDP per head • Convergence of employment • Convergence of Growing productivity • Dependence rate	Maintaining social cohesion is important not only in itself but for underpinning economic development which is liable to be threatened by discontent and political unrest if disparities within society are too wide. Access to employment is of key significance since it determines in most cases whether people are able both to enjoy a decent standard of living and contribute fully to the society in which they live. It's a measure of : • Unemployment rate • risk of poverty

	• population and population density • education
Territorial Cohesion The concept of territorial cohesion extends beyond the notion of economic and social cohesion by both adding to this and reinforcing it. In policy terms, the objective is to help achieve amore balanced development by reducing existing disparities, avoiding territorial imbalances and by making both sectoral policies which have a spatial impact and regional policy more coherent. The concern is also to improve territorial integration and encourage cooperation between regions	

Starting to the results of the 3rd Cohesion Report an index of the Cohesion cam be bild using the follow concepts:

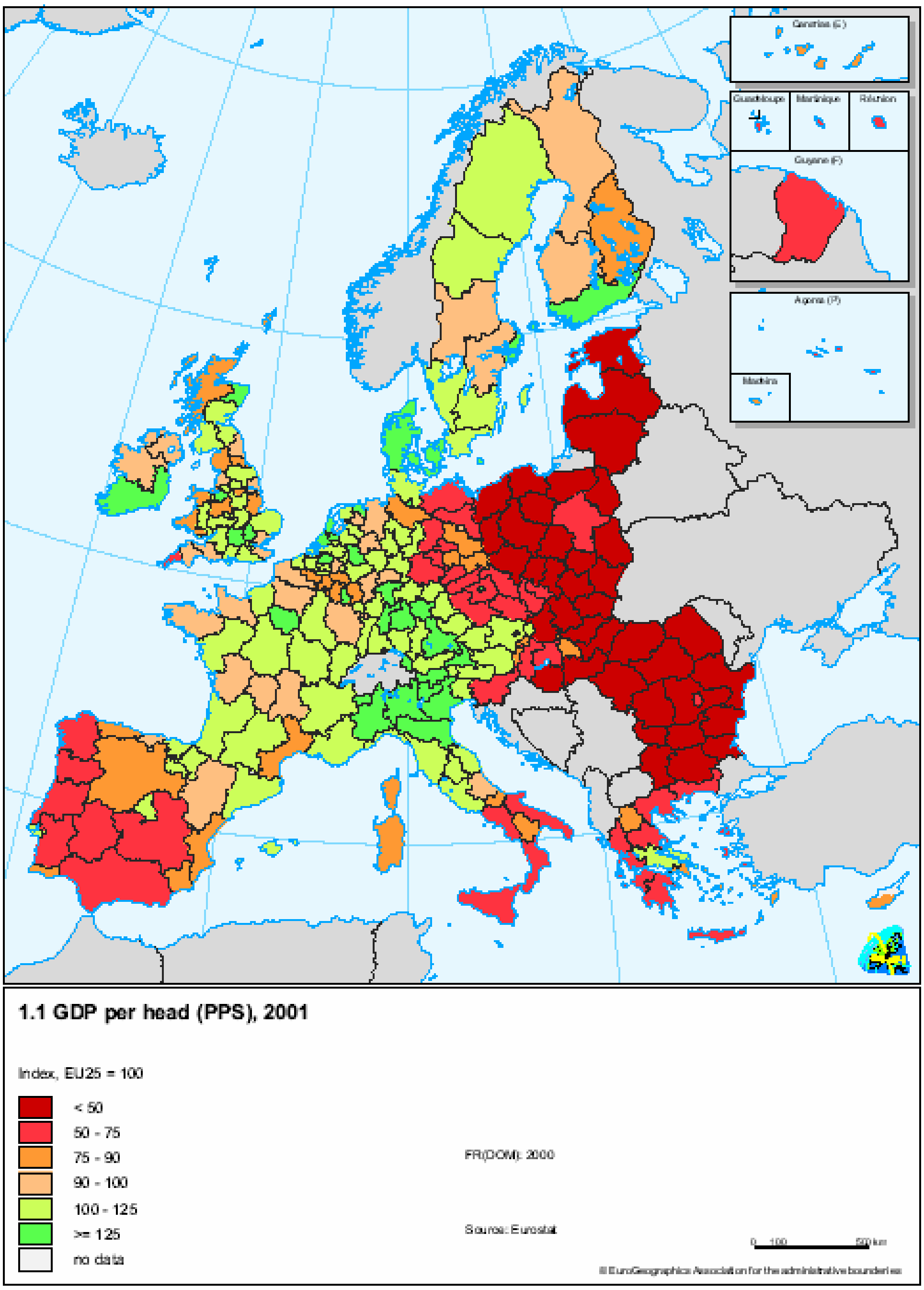
- disparity in income ($GDPxp_{PPS}$)
- disparity in employment (Emp_c)
- territorial accessibility (A)
- level of education (Ed_c)
- expenditure in R&D (R&D exp)

according whit the methodology the Cohesion index (cfr 3rd cohesion report) will be:

$$Coes = \sqrt{(1 - GDPxp_{PPS})^2 + (1 - Emp_{cs})^2 + (1 - A)^2 + (1 - Ed_{cs})^2 + (1 - R\,\&\,D\,\exp)^2}$$

A measured of the disparity in income can be given by the follow map elaborated in 3rd Cohesion Report, that show the distribution of the GDP per head (PPS) in the UE regions.

<u>Disparity in income ($GDPxp_{PPS}$)</u>



Starting by the results of 3rd Cohesion Report we can change the classes of values attributed by the project in the following values. We attribute the value:

1 to <50

2 to 50-75

3 to 75-90

4 to 90-100

5 to 100-125

6 to >125

an so we can calculate the GDP per head normalized index:

$$\mathrm{GDPxp}_{PPS\,j}^{\;N} = \frac{GDPxp_{PPS\,j}}{\sqrt{\sum_{j=1}^{m} GDPxp_{PPS\,j}^{\;2}}}$$

<u>Disparity in employment (Emp_C)</u>

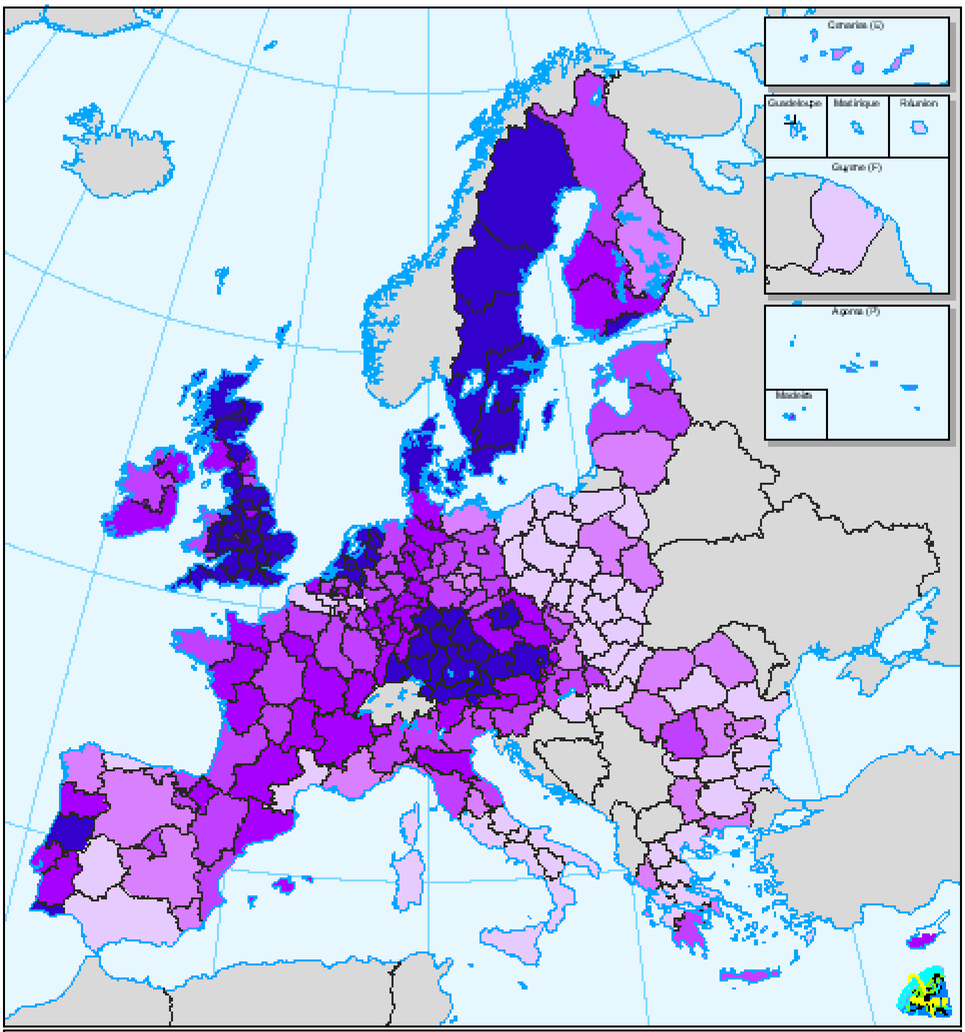
A measured of the disparity in employment can be given unifying towo different values: Employment rate (Emp_R) and Employment in High technology (Emp_{HT})

so a measure of the state of the employment to increasing of the cohesion will be:

$$\mathrm{Emp}_C = \sqrt{(1 - Emp_R^{\;N})^2 + (1 - Emp_{HT}^{\;N})^2}$$

Employment rate (Emp_R)

By the follow map elaborated in 3rd Cohesion Raport, that show the distribution of the employment rate in the UE regions.



1.2 Employment rates, 2002

Employed 15-64 as % of population 15-64

- < 56.0
- 56.0 - 60.2
- 60.2 - 64.4
- 64.4 - 68.6
- >= 68.6
- no data

EU27 = 62.4
Standard deviation = 8.4

Sources: Eurostat and National Statistical Offices

0 100 500 km

© EuroGeographics Association for the administrative boundaries

Starting by the results of 3rd Cohesion Report project we can change the classes of values attributed by the project in the following values. We attribute the value:

1 to <56.0

2 to 56.0-60.2

3 to 60.2-64.4

4 to 64.4-68.6

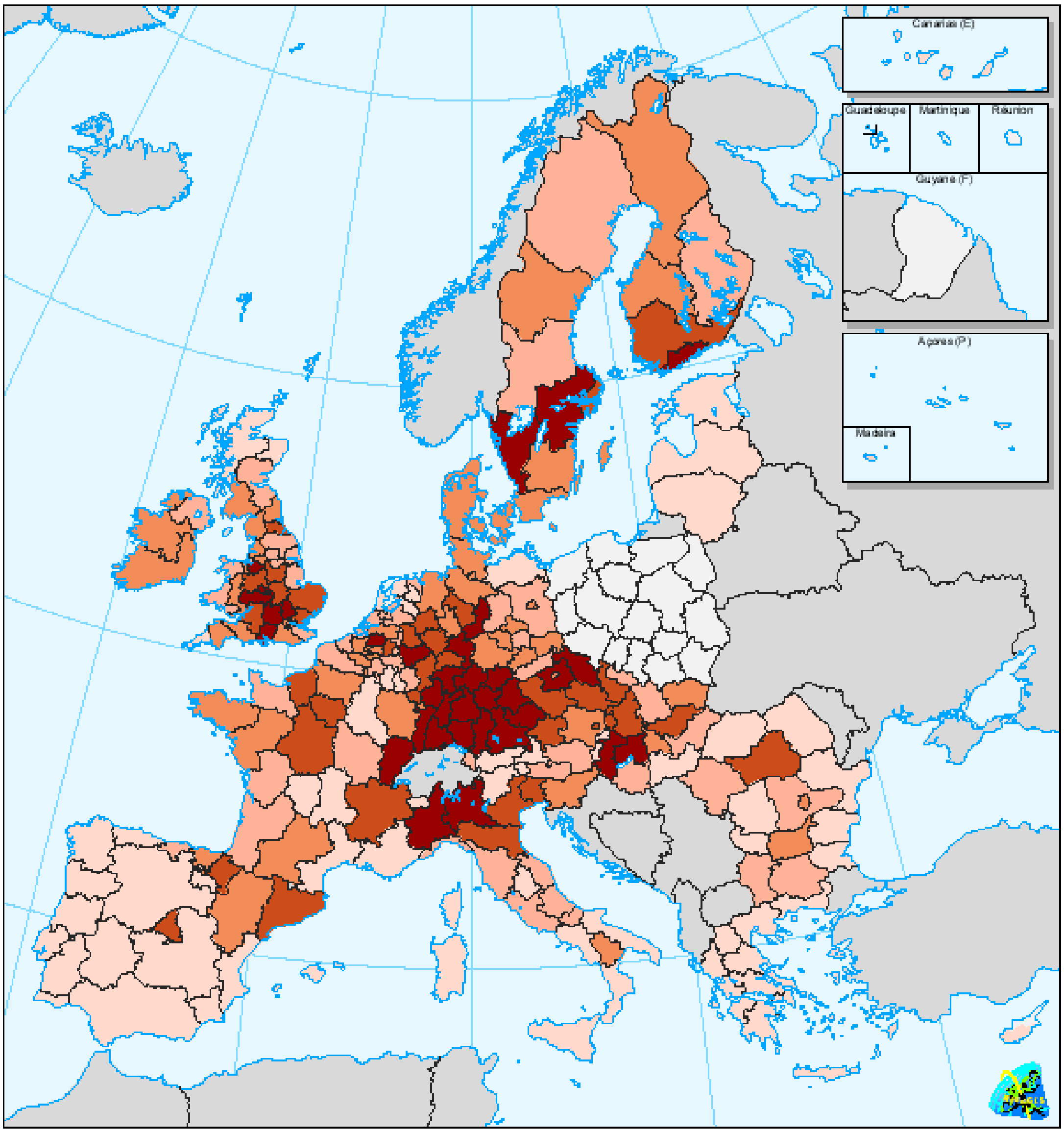
5 to >68.6

an so we can calculate the Employment normalized index:

$$\mathrm{Emp}_{R_j}{}^{N} = \frac{Emp_{R\,j}}{\sqrt{\sum_{j=1}^{m} EmpR_j^2}}$$

Employment in High Tecnology

Given the importance of high tech sector in the increasing of cohesion in additional to the employment rate we must take in consideration the specific employment in this sector (map below).



1.11 Employment in high-technology sectors, 2002

% of total employment

- < 7.45
- 7.45 - 9.55
- 9.55 - 11.65
- 11.65 - 13.75
- >= 13.75
- no data

Average = 10.6
Standard deviation = 4.30

Source: Eurostat

0 100 500 km

Starting by the results of 3rd Cohesion Report project we can change the classes of values attributed by the project in the following values. We attribute the value:

1 to <7.45

2 to 7.45-9.55

3 to 9.55-11.65

4 to 11.65-13.75

5 to > 13.75

an so we can calculate the employment in high techology sector normalized index:

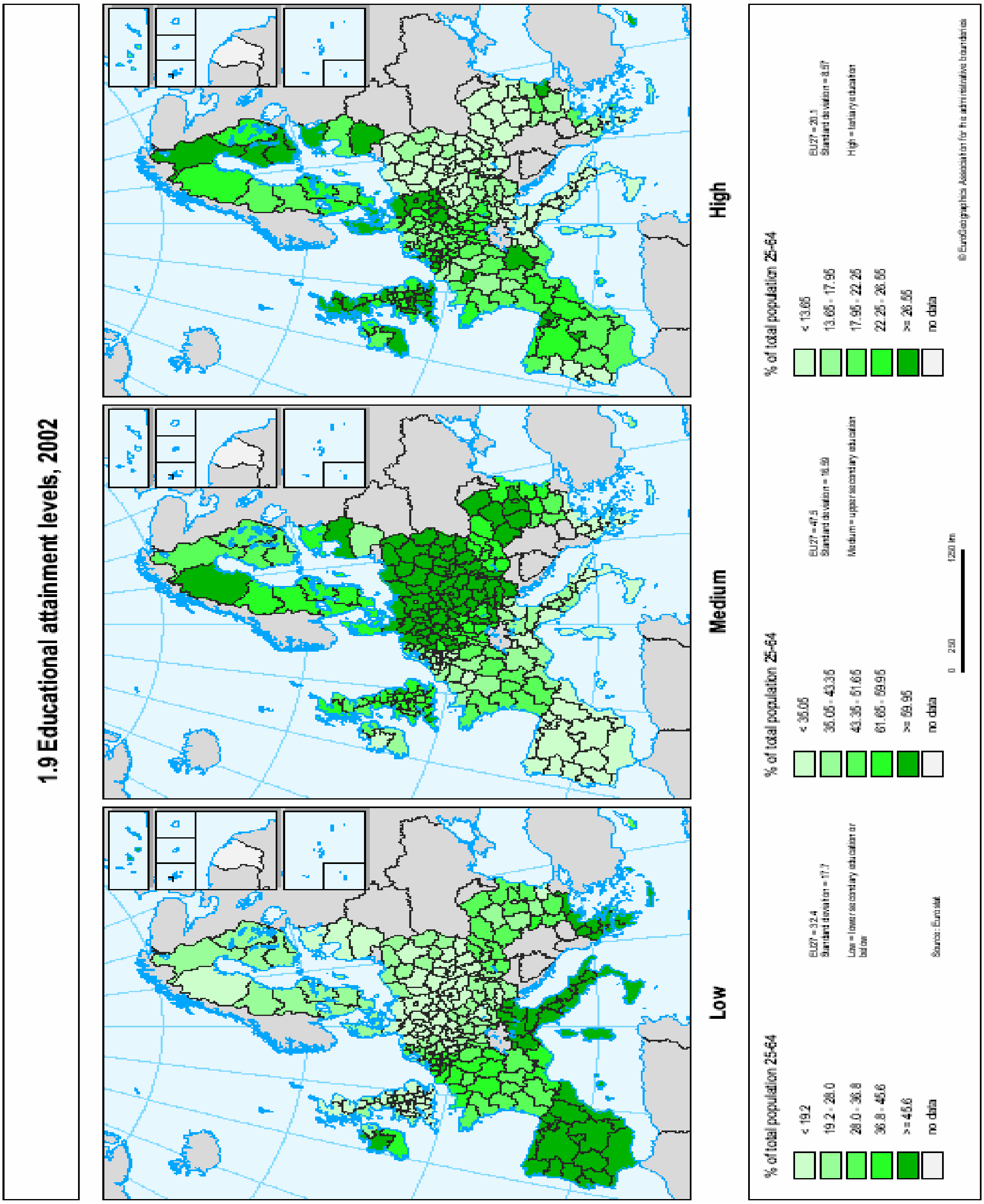
$$\mathrm{Emp}_{HT\,j}^{\;N} = \frac{Emp_{HT\,j}}{\sqrt{\sum_{j=1}^{m} Emp_{HT\,j}^{\;2}}}$$

Accessibility

Cfr. Annex A2 Global local interaction pag. 47

Education

A measure of the level of education like a element of the cohesion between the UE regions can be given by the follow map elaborated in 3rd Cohesion Raport, that show the level of education (low, medium, high).



Starting by the results of the three map above (low, medium, high) we can change the classes of values attributed in the following values. We attribute the value:

For the low educational	For the medium educational	For the high educational
1 to <19.2	1 to < 36.5	1 to < 13.65
2 to 19.2-28.0	2 to 36.5-43.35	2 to 13.65-17.95
3 to 28.0-36.8	3 to 43.35-51.65	3 to 17.95-22.25
4 to 36.8-45.6	4 to 51.65-59.95	4 to 22.25-26.55
5 to <45.6	5 to >59.95	5 to > 26.55

and so we can calculate the educational (low, medium, high) normalized index

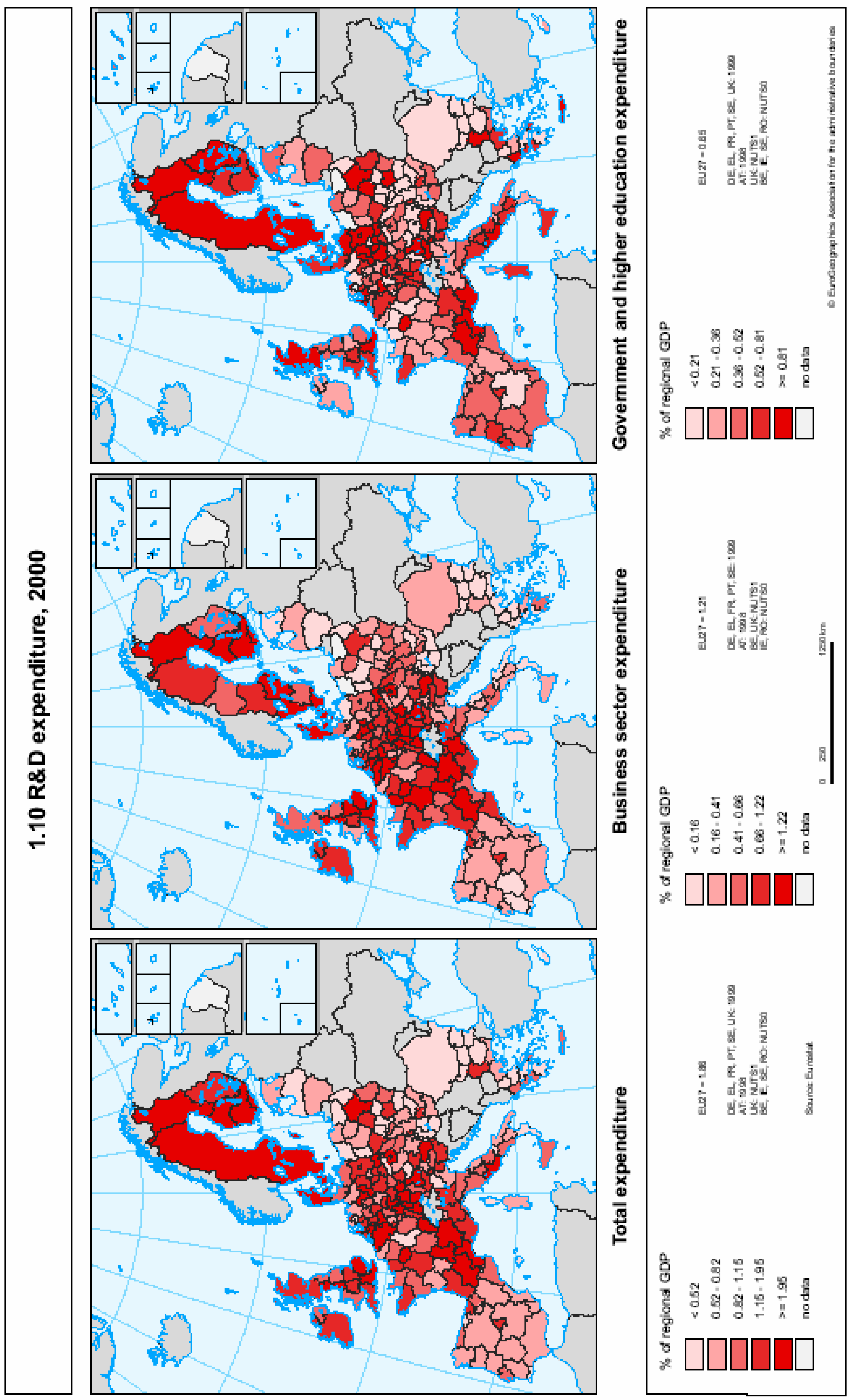
$$\mathrm{Ed}_{low\,j}^{\;N} = \frac{Ed_{low\,j}}{\sqrt{\sum_{j=1}^{m} Ed_{low\,j}^{\;2}}} \quad \mathrm{Ed}_{medium\,j}^{\;N} = \frac{Ed_{medium\,j}}{\sqrt{\sum_{j=1}^{m} Ed_{medium\,j}^{\;2}}} \quad \mathrm{Ed}_{high\,J}^{\;N} = \frac{Ed_{high\,j}}{\sqrt{\sum_{j=1}^{m} Ed_{high\,j}^{\;2}}}$$

so a measure of the educational level like a contribute of social cohesion will be:

$$\mathrm{Ed}_{\mathrm{coes}} = \sqrt{(1 - Ed_{low}^{\;N})^2 + (1 - Ed_{medium}^{\;N})^2 + (1 - Ed_{high}^{\;N})^2}$$

Expenditure level in R&D (R&D exp)

A measure of the level of expenditure in R&D like an element of the cohesion between the UE regions can be given by the follow three map elaborated in 3rd Cohesion Raport, that show the level expenditure in R&D (total, business sector, government and higher education)



Starting by the results of the three map above we can change the classes of values attributed in the following values. We attribute the value:

For the R&D total expendiutre
1 to <0.52
2 to 0.52-0.82
3 to 0.82-1.15
4 to 1.15-1.95
5 to <1.95

and so we can calculate the R&D expenditure normalized index

$$\mathrm{R\&Dexp}_j^{\ N} = \frac{R\,\&\,D\exp_j}{\sqrt{\sum_{j=1}^{m} R\&D\exp_j^2}}$$

A4.3. Natural resources (NR use)

The level of interaction of the natural resources in the "use of resources and funds" typology (NR) will be function of:

- safeguard (Sg)
- consumption (EC)
- production (Prod)
- sustainability (ESI)

$$NR_{use} = \sqrt{Sg^2 + EC^2 + \Pr od^2 + (1 - SII)^2}$$

A4.3.1. Safeguard (Sg)

This category is calculated in function of the level of the biodiversity (BioDiv) and the world heritage sites (WHS):

biodiversity index

$$\mathrm{BioDiv}_j^{\ N} = \frac{BioDiv_j}{\sqrt{\sum_{j=1}^{m} BioDiv_j^2}}$$

world heritage sites index

$$\mathrm{WHS}_j^{\ N} = \frac{WHS_j}{\sqrt{\sum_{j=1}^{m} WHS_j^2}}$$

the safeguard index:

$$\mathrm{Sg} = \sqrt{(1 - BioDiv^N)^2 + (1 - WHS^N)^2}$$

A4.3.2. Consumption (EC)

Cfr. Annex A3 Quality pag. 67

A4.3.3. Production (W)

<u>Waste</u>

Cfr. Annex A3 Quality pag. 69

<u>Pollution</u>

$$\mathrm{Poll}_{air\,j}^{N} = 1 - \frac{Pollair_j}{\sqrt{\sum_{j=1}^{m} Pollair_j^2}} \quad \mathrm{Poll}_{water\,j}^{N} = 1 - \frac{Poll_{water\,j}}{\sqrt{\sum_{j=1}^{m} Poll_{water\,j}^{2}}} \quad \mathrm{Poll}_{soil\,j}^{N} = 1 - \frac{Poll_{soil\,j}}{\sqrt{\sum_{j=1}^{m} Poll_{soil\,j}^{2}}}$$

$$Poll_{total} = \sqrt{(1 - Poll_{AIR}{}^{N})^2 + (1 - Poll_{WATER}{}^{N})^2 + (1 - Poll_{SOIL}{}^{N})^2}$$

the production index:

$$\mathrm{Pr}\,od = \sqrt{W^2 + Poll_{total}{}^2}$$

A4.3.4. Sustainability (ESI)

The Environmental Sustainability Index (ESI) benchmarks the ability of nations to protect the environment over the next several decades. It does so by integrating 76 data sets – tracking natural resource endowments, past and present pollution levels, environmental management efforts, and the capacity of a society to improve its environmental performance – into 21 indicators of environmental sustainability.

These indicators permit comparison across a range of issues that fall into the following five broad categories:

- Environmental Systems
- Reducing Environmental Stresses
- Reducing Human Vulnerability to EnvironmentalStresses
- Societal and Institutional Capacity to Respondto Environmental Challenges
- Global Stewardship

therefore the normalization of the ESI will be:

$$\mathrm{ESI}_j{}^N = \frac{ESI_j}{\sqrt{\sum_{j=1}^{m} ESI_j^2}}$$

Table 1: 2005 Environmental Sustainability Index – Scores and Rankings

ESI Rank	Country Name	ESI Score	OECD Rank	Non-OECD Rank	Comp-onents
1	Finland	75.1	1		
2	Norway	73.4	2		
3	Uruguay	71.8		1	
4	Sweden	71.7	3		
5	Iceland	70.8	4		
6	Canada	64.4	5		
7	Switzerland	63.7	6		
8	Guyana	62.9		2	
9	Argentina	62.7		3	
10	Austria	62.7	7		
11	Brazil	62.2		4	
12	Gabon	61.7		5	
13	Australia	61.0	8		
14	New Zealand	60.9	9		
15	Latvia	60.4		6	
16	Peru	60.4		7	
17	Paraguay	59.7		8	
18	Costa Rica	59.6		9	
19	Croatia	59.5		10	
20	Bolivia	59.5		11	
21	Ireland	59.2	10		
22	Lithuania	58.9		12	
23	Colombia	58.9		13	
24	Albania	58.8		14	
25	Central Afr. Rep.	58.7		15	
26	Denmark	58.2	11		
27	Estonia	58.2		16	
28	Panama	57.7		17	
29	Slovenia	57.5		18	
30	Japan	57.3	12		
31	Germany	56.9	13		
32	Namibia	56.7		19	
33	Russia	56.1		20	
34	Botswana	55.9		21	
35	P. N. Guinea	55.2		22	
36	France	55.2	14		
37	Portugal	54.2	15		
38	Malaysia	54.0		23	
39	Congo	53.8		24	
40	Netherlands	53.7	16		
41	Mali	53.7		25	
42	Chile	53.6		26	
43	Bhutan	53.5		27	
44	Armenia	53.2		28	
45	United States	52.9	17		
46	Myanmar	52.8		29	
47	Belarus	52.8		30	
48	Slovakia	52.8	18		
49	Ghana	52.8		31	
50	Cameroon	52.5		32	
51	Ecuador	52.4		33	
52	Laos	52.4		34	
53	Cuba	52.3		35	
54	Hungary	52.0	19		
55	Tunisia	51.8		36	
56	Georgia	51.5		37	
57	Uganda	51.3		38	
58	Moldova	51.2		39	
59	Senegal	51.1		40	
60	Zambia	51.1		41	
61	Bosnia & Herze.	51.0		42	
62	Israel	50.9		43	
63	Tanzania	50.3		44	
64	Madagascar	50.2		45	
65	United Kingdom	50.2	20		
66	Nicaragua	50.2		46	
67	Greece	50.1	21		
68	Cambodia	50.1		47	
69	Italy	50.1	22		
70	Bulgaria	50.0		48	
71	Mongolia	50.0		49	
72	Gambia	50.0		50	
73	Thailand	49.7		51	
74	Malawi	49.3		52	

The column labeled "components" contains bar charts for the five ESI core components – Systems, Stresses, Vulnerability, Capacity, and Global Stewardship – that shows the relative strengths and weaknesses for each country. Higher bars correspond to higher levels of sustainability. The relative heights are comparable across components and across countries.

ESI Rank	Country Name	ESI Score	OECD Rank	Non-OECD Rank	Comp-onents
75	Indonesia	48.8		53	
76	Spain	48.8	23		
77	Guinea-Bissau	48.6		54	
78	Kazakhstan	48.6		55	
79	Sri Lanka	48.5		56	
80	Kyrgyzstan	48.4		57	
81	Guinea	48.1		58	
82	Venezuela	48.1		59	
83	Oman	47.9		60	
84	Jordan	47.8		61	
85	Nepal	47.7		62	
86	Benin	47.5		63	
87	Honduras	47.4		64	
88	Côte d'Ivoire	47.3		65	
89	Serbia & Monteneg.	47.3		66	
90	Macedonia	47.2		67	
91	Turkey	46.6	24		
92	Czech Rep.	46.6	25		
93	South Africa	46.2		68	
94	Romania	46.2		69	
95	Mexico	46.2	26		
96	Algeria	46.0		70	
97	Burkina Faso	45.7		71	
98	Nigeria	45.4		72	
99	Azerbaijan	45.4		73	
100	Kenya	45.3		74	
101	India	45.2		75	
102	Poland	45.0	27		
103	Niger	45.0		76	
104	Chad	45.0		77	
105	Morocco	44.8		78	
106	Rwanda	44.8		79	
107	Mozambique	44.8		80	
108	Ukraine	44.7		81	
109	Jamaica	44.7		82	
110	United Arab Em.	44.6		83	
111	Togo	44.5		84	
112	Belgium	44.4	28		
113	Dem. Rep. Congo	44.1		85	
114	Bangladesh	44.1		86	
115	Egypt	44.0		87	
116	Guatemala	44.0		88	
117	Syria	43.8		89	
118	El Salvador	43.8		90	
119	Dominican Rep.	43.7		91	
120	Sierra Leone	43.4		92	
121	Liberia	43.4		93	
122	South Korea	43.0	29		
123	Angola	42.9		94	
124	Mauritania	42.6		95	
125	Philippines	42.3		96	
126	Libya	42.3		97	
127	Viet Nam	42.3		98	
128	Zimbabwe	41.2		99	
129	Lebanon	40.5		100	
130	Burundi	40.0		101	
131	Pakistan	39.9		102	
132	Iran	39.8		103	
133	China	38.6		104	
134	Tajikistan	38.6		105	
135	Ethiopia	37.9		106	
136	Saudi Arabia	37.8		107	
137	Yemen	37.3		108	
138	Kuwait	36.6		109	
139	Trinidad & Tobago	36.3		110	
140	Sudan	35.9		111	
141	Haiti	34.8		112	
142	Uzbekistan	34.4		113	
143	Iraq	33.6		114	
144	Turkmenistan	33.1		115	
145	Taiwan	32.7		116	
146	North Korea	29.2		117	

A4.4. Resource for the Innovation (SII)

The Summary Innovation Index (SII) by EIS 2004 provides an overview of the relative national innovation performances. The SII is calculated for all countries, based on a number of available indicators, which can vary from 12 to 20 depending on the country.
The SII is calculated for all countries, based on a number of available indicators, which can vary from 12 to 20 depending on the country. Ideally,

one would like to compare all countries using all indicators in one SII. However, data are unavailable for a number of indicators for several new Member States, the Applicant Countries, the US and Japan. Consequently, the innovation rankings based on the 2004 SII need to be interpreted with caution. Furthermore, the SII is a relative instead of an absolute ranking. Having an SII twice that of another country does not mean that the absolute innovation performance is also twice as good.

The EIS 2004 covers the 25 EU Member States, Bulgaria, Romania and Turkey, the associate countries Iceland, Norway and Switzerland, as well as the US and Japan. The indicators of the EIS summarise the main drivers and outputs of innovation. These indicators are divided into four groups:

- Human resources for innovation (5 indicators);
- The creation of new knowledge (4 indicators);
- The transmission and application of knowledge (4 indicators);
- Innovation finance, output and markets (7 indicators).

Therefore an indicator of synthesis of the level of resources designated for the innovation is the Innovation index:

$$\mathrm{SII}_j^N = \frac{SII_j}{\sqrt{\sum_{j=1}^{m} SII_j^2}}$$

European Spatial Planning Observation Network

ESPON Project nr. 3.3

Territorial dimension of the Lisbon-Gothenburg strategy

Second Interim Report

APPENDIX 0
Mapping exercise on the first determinant: "Innovation & Research"

I REVISED VERSION
(23 April 2005)

31 march 2005

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

Mapping exercise on the first determinant: “Innovation & Research”

At this stage of the project, the main emphasis has been put on the completion of the methodology and the combination of the various indicators-categories-sectors-typologies following the theory developed on the concept of competitiveness in sustainability.

Throughout the development of the methodology described in chap.2 of the SIR and in the annex, the issue of data availability has been, of course, taken into account, but not in a categorical way. That is to say, although in some cases it is already known that the data at the desired level of geographical detail and/or thematic breakdown, the elaboration on the specific issue/indicator has been performed anyway. It is planned to put into evidence the problem of data gaps in the future development of the project, also in sight of the recent announced release of the datasets on Sustainable Development by Eurostat.

Nevertheless, also in this first stage, a feedback from the data gathering activity has led to a slight modification on the indicators chosen, wherever possible without influencing dramatically the approach.

Concerning the mapping activity, it has been decided to work in parallel on the short-list of indicators and on those related to the complete methodology, planning to perform a comparison that, at the state of the art of the work done so far, is by no means feasible.

The details on the data gathering, analysis and mapping will be included in the following reports.

The maps have been produced according to the method described in detail in Annex1 – Chap. 1, to obtain the first determinant “Innovation and Research”.

Intermediate and synthesis maps have been produced, in order to show the possibility of reading information from the statistical data at different stages of the process.

The task of making the determinants “visible” through maps is, in this particular case, very difficult and delicate, especially in terms of the significance of the results, given the huge amount of variables required to build up the determinants as defined in the methodology.

Although the definition of the "patterns" to reach the determinants from indicators (and data) has been performed trying to take into account the sore point of data availability, it has been soon very clear that if we wanted to perform a mapping exercise on at least one determinant to be included in the Second Interim Report (SIR), the only possibility was to make it at the national level, and even at this broad level, a scattered lack of data would have caused widely incomplete maps of the so-called Espon space.

For this reason and because the TPG is trying to simplify the definition of the determinants, also in order to focus on a lesser amount of indicators of better geographical coverage, one should consider the maps that are here presented just as the result of a "feasibility check". By no means, should they be considered conclusive or bearer of a policy message, nor –at this stage- they should be compared to those presented in chap.3 and app.1. On the other hand, they may serve to give a first, coarse "feedback" on the significance of the choices made to define the indicators and their combinations. Moreover, the work made on data gathering and harmonisation (in time and space) and their combination according to the methodological definitions, represents an useful exercise and experience towards the construction of a "map-making facility" in support of the TPG's approach.

Therefore, this short document contains only some comments and general description on the work made, as a more detailed description will be dedicated to the mapping which will be performed according to the forthcoming final methodology.

As also described elsewhere in the report, the basic strategy is to make use, as much as possible, of the results of other ESPON projects and consequently, of the data contained in the ESPON DataBase. For indicators/data not included in there, official data collected from Eurostat and, if needed, from national sources, have been gathered.

The maps here included concern the determinant "Innovation and Research", described in the first chapter of the Annex, and follow the "indicators tree" of tab. A1.

As a general rule, the classification of the data values in 4 ranks for the subsequent combinations and processing, has been performed as follows:

1st class: $x <=$ Avg – 1 Std. Deviation

2nd class: Avg – 1 Std. Deviation $< x <=$ Avg

3rd class: Avg $< x <=$ Avg + 1 Std. Deviation

4th class: $x >$ Avg + 1 Std. Deviation

With x the data value of a given nation, and Avg. the average value of the data distribution.

Although this has often led to non-uniform class numerosity, due to the rather small number of values in the distribution, we have –at this stage- preferred to stick to this classification scheme that was, in our opinion, a more quantitative one. The TPG is of course addressing this issue in a more scientific statistical study that will be included in the next reports.

Data refer to the year 2001, with few exceptions, scattered across nations/indicators, ranging at most +/- 2 years. For the preceding reasons, details on data gaps are not here shown.

The index of maps, with their reference to the corresponding section of the annex, is the following:

Map 1 VIRTUAL FIRMS (A1.1.1.1)

Map 2 VIRTUAL POPULATION (A1.1.1.2)

Map 3 VIRTUAL INSTITUTION (A1.1.1.3)

Map 4 VIRTUAL SOCIETY (A1.1.1)

Map 5 R&D EXPENDITURE (A1.1.2.1)

Map 6 R&D INFRASTRUCTURE (A1.1.2.2)

Map 7 KNOWLEDGE CREATION (A1.1.2)

Map 8 INNOVATIVE HUMAN CAPITAL (STRUCTURE) (A1.3.2)

Map 9 INNOVATIVE HUMAN CAPITAL (EDUCATION) (A1.3.1)

Map 10 KNOWLEDGE AND INFORMATION SOCIETY (A.1.1)

Map 11 TECHNOLOGICAL EQUIPMENT (A1.2)

Map 12 INNOVATIVE HUMAN RESOURCES (A1.3)

Map 13 INNOVATION AND RESEARCH

Map 14 INNNOVATION AND RESEARCH WITH URBAN-RURAL TYPOLOGIES

This index lists in RED the "Categories", in BLUE the "Sectors", in GREEN the "Typologies" and in VIOLET the "Determinant"

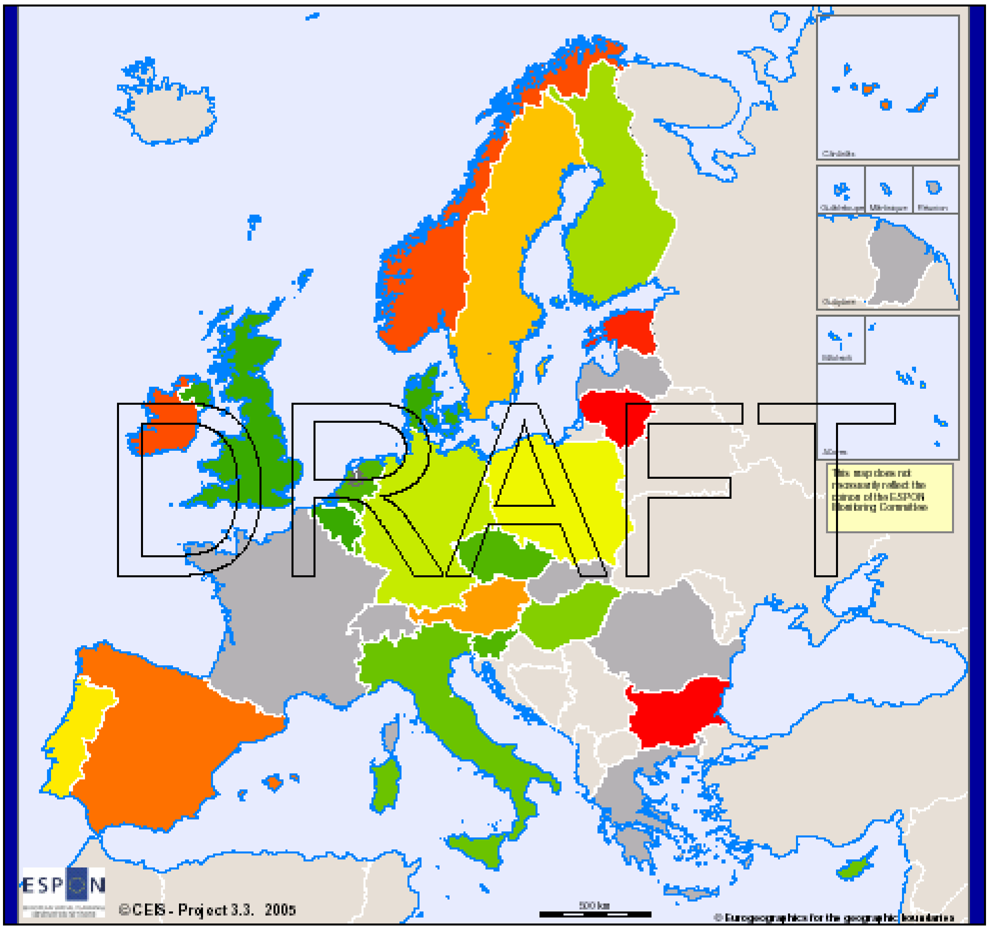
As a result of the lack of data, especially arising from the sector "Virtual Society", where the largest amount of basic indicators is used, the final composition of typologies into the determinant would have given a map consisting of only 8 coloured nations out of 27.

Concerning Map 13, in order to provide a (possibly) more meaningful result, it has been decided to include in the final calculation by the "ideal vector" method, also those nations which had data in 2 typologies out of the 3 defined, putting as a value of the missing one, that corresponding to the worst possible case, that is –in normalized terms- 1 (see formula A1, p.7).

Over this map, according to the idea of giving a deeper territorial differentiation based on the Urban-Rural typologies defined in project 1.1.2 (SIR, chap. 2.1, pag.29-30) , the distribution of the 6 U-R typologies has been drawn as opacity triggers of the underlying colour representing the class of pertinence to the given nation. The lighter the colour (pure colour in the case of U-R typology "1"-high urban influence, high human intervention) the higher the degree of urbanization/anthropization of the territory, and vice-versa.

As mentioned above, the interpretation of the results shown by these maps is under development, along with the re-arrangement of the methodology. The interested reader is recommended to contact the LP team for further clarifications.

Map 1 - "Virtual Firms" (see Annex1 - A.1.1.1.1)



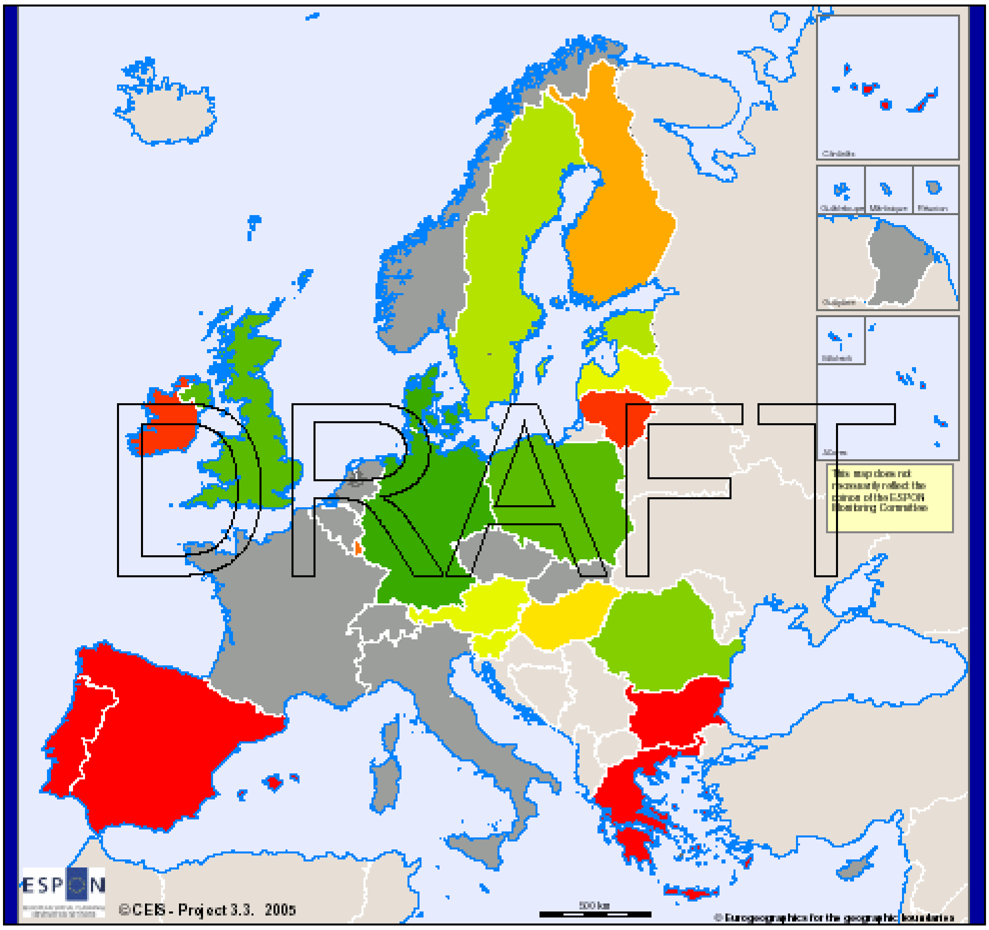
Legend

QUALITATIVE RANKING (A1:BEST - D4:WORST)

A1 A2 A3 A4 B1 B2 B3 B4 C1 C2 C3 D2 D3 D4

Incomplete Data

Map 2 - "Virtual Population" (see Annex1 - A.1.1.1.2)



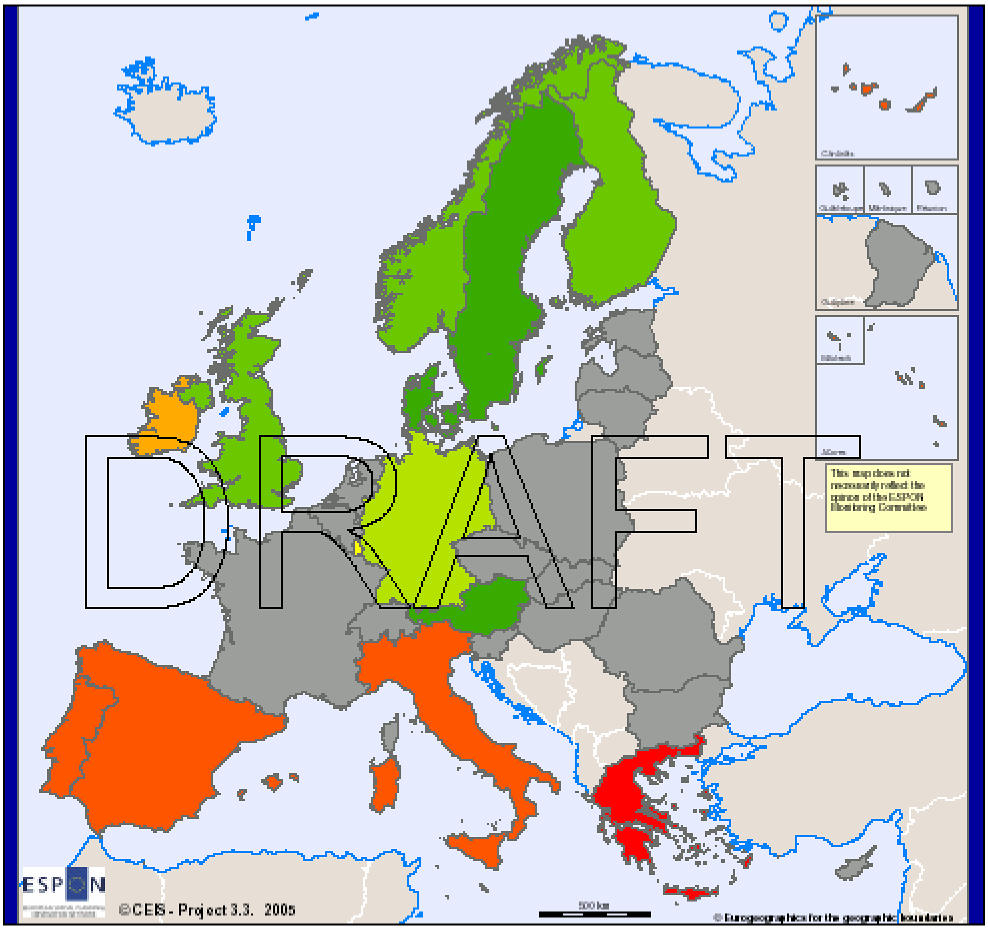
Legend

QUALITATIVE RANKING (A1:BEST - B4:WORST)

A1 A2 A3 B1 B2 B3 C1 C2 D3 D4

Incomplete Data

Map 3 - "Virtual Institutions" (see Annex1 - A.1.1.1.3)



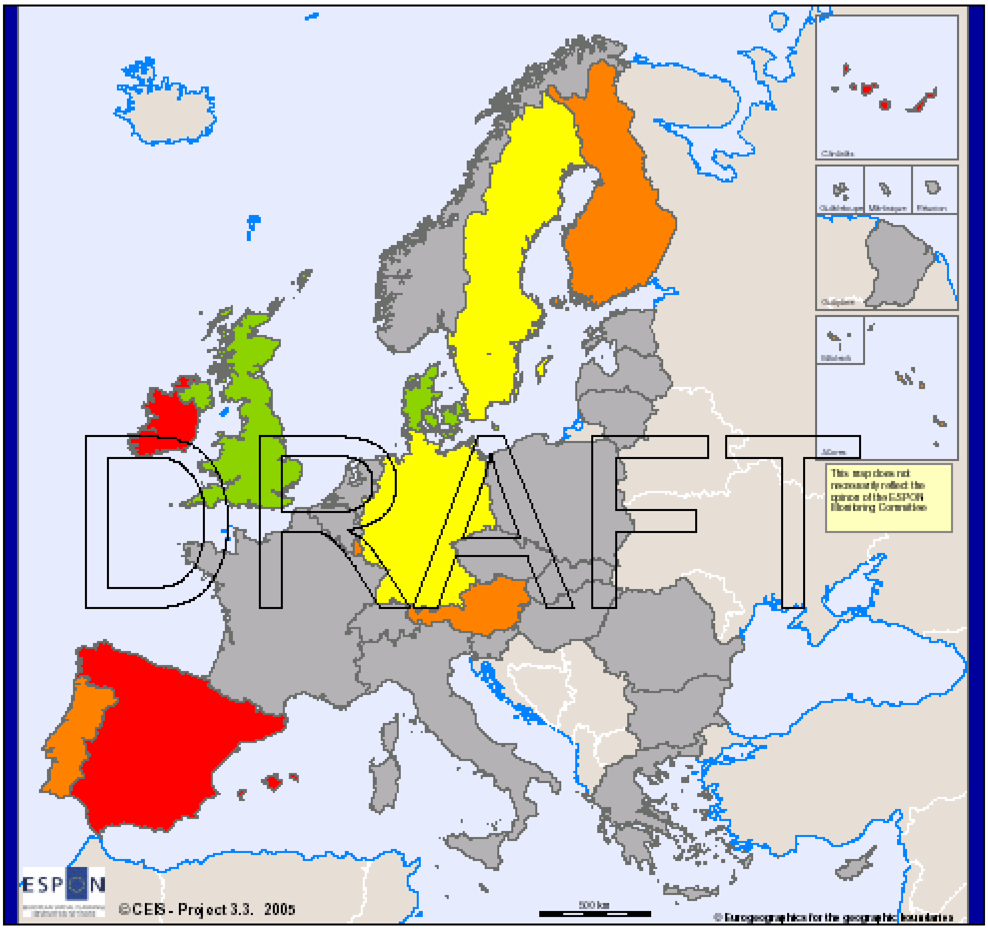
Legend

QUALITATIVE RANKING (A1:BEST - D4:WORST)

A1 A2 A3 A4 D2 D3 D4

Incomplete Data

Map 4 - "Virtual Society" (see Annex1 - A.1.1.1)

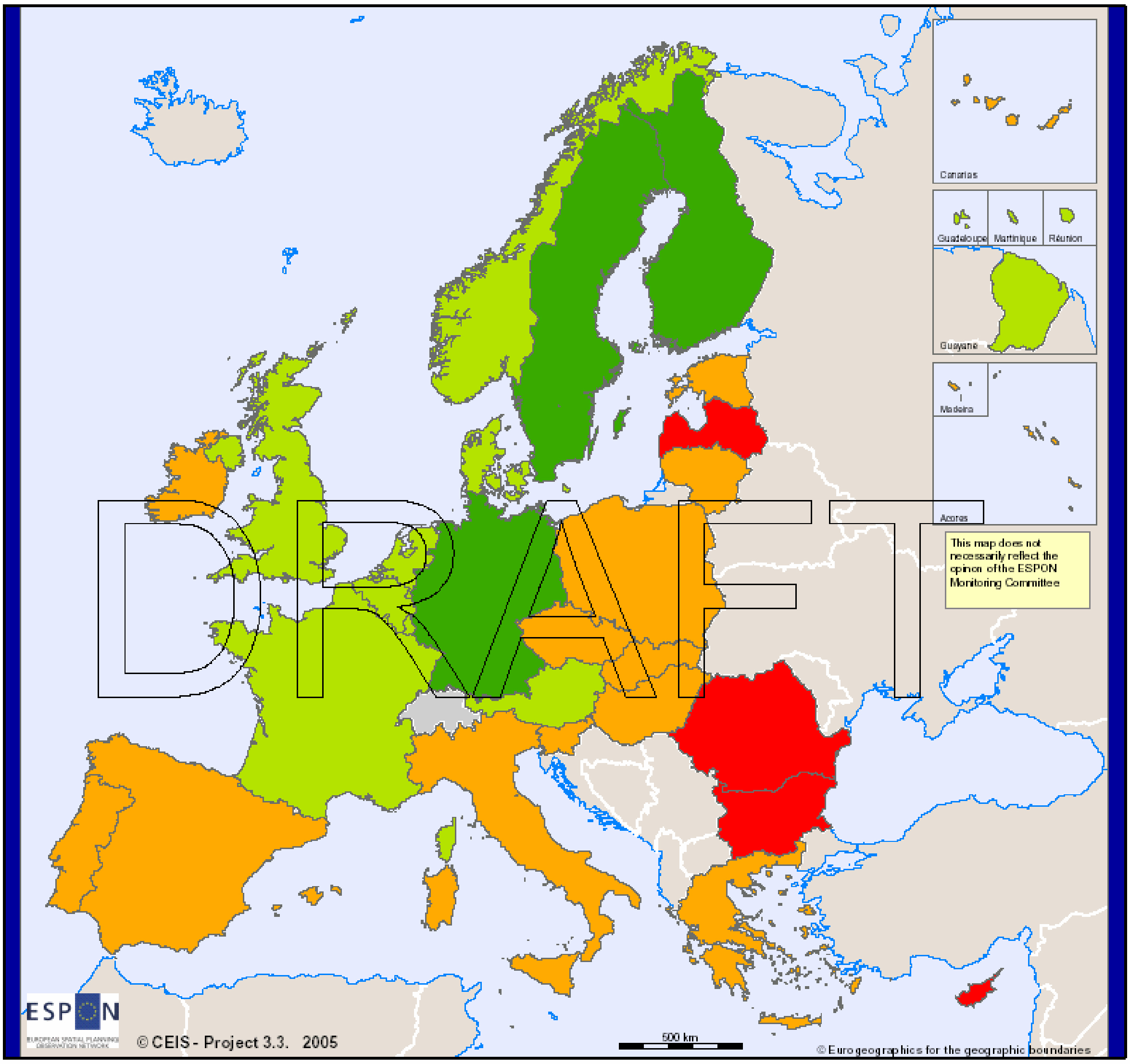


Legend

VIRTUAL SOCIETY

- Incomplete Data
- 0 - 0.50772
- 0.50773 - 1.11555
- 1.11556 - 1.64655
- 1.64656 - 1.71659

Map 5 - "R&D Expenditure" (see Annex1 - A.1.1.2)

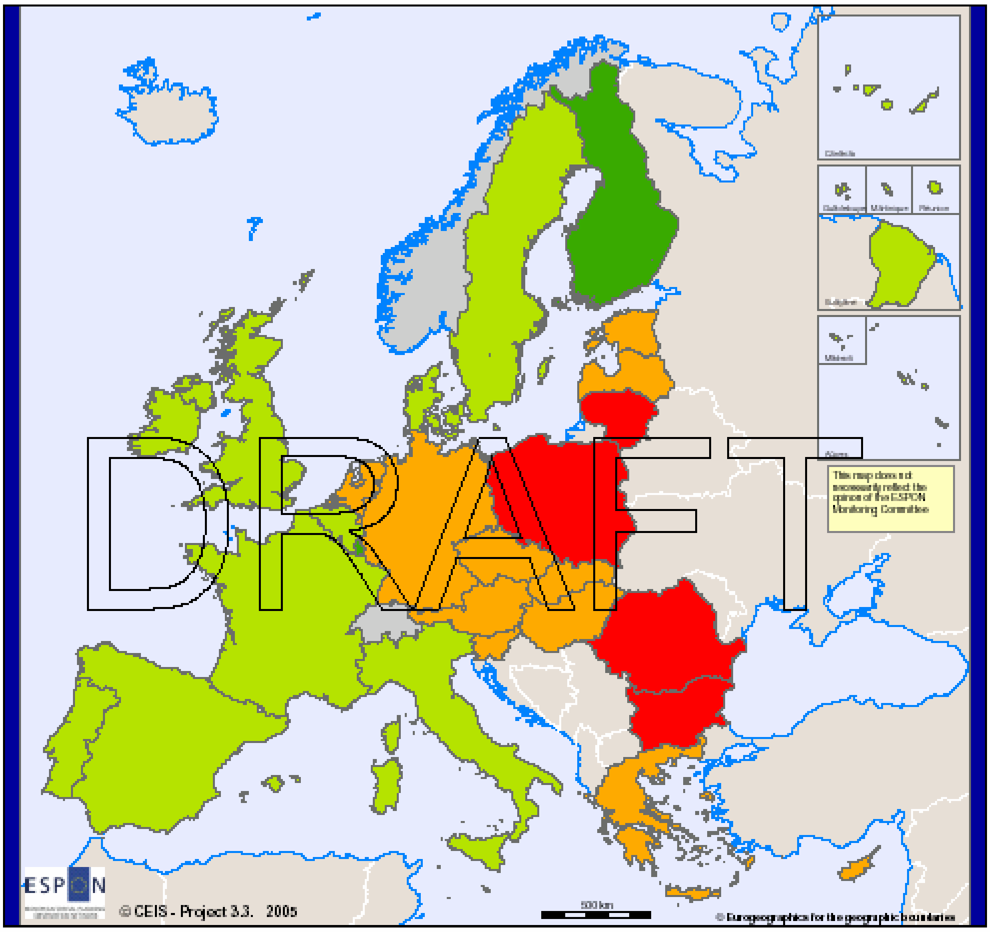


Legend

R&D EXPENDITURE/GDP

- RANK A: 2.53% - 4.27%
- RANK B: 1.67% - 2.52%
- RANK C: 0.58% - 1.53%
- RANK D: 0.32% - 0.49%
- No Data

Map 6 - "R&D Infrastructure" (see Annex1 - A.1.1.2)

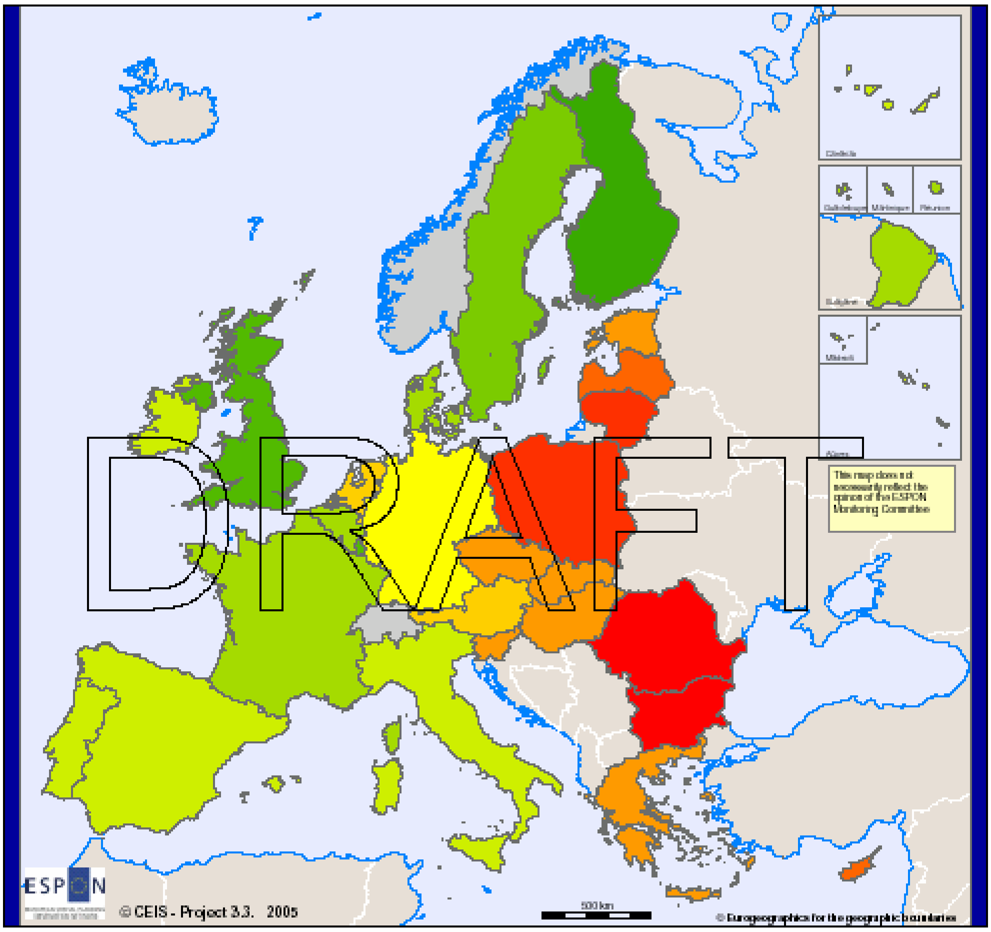


Legend

RDI

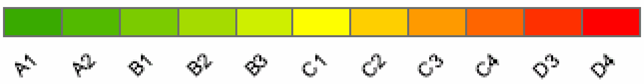
- High
- Medium-high
- Medium-low
- Low

Map 7 - "Knowledge Creation" (see Annex1 - A.1.1.2)

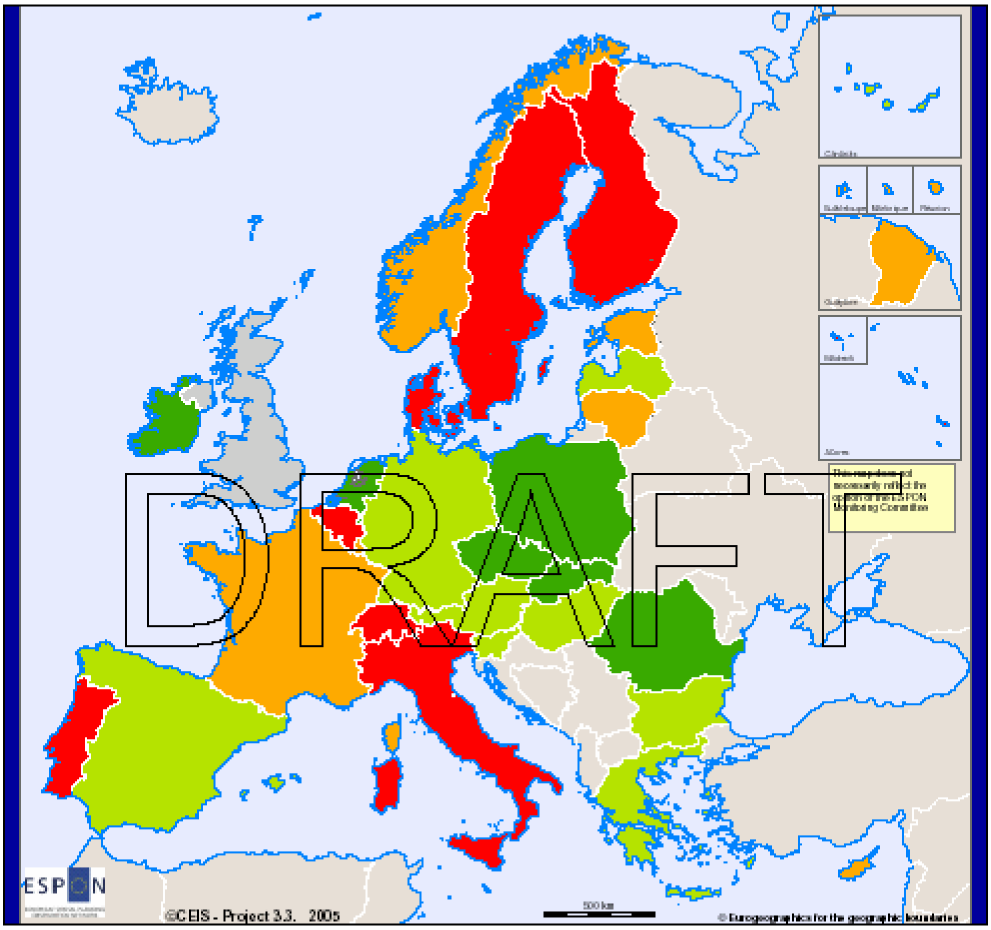


Legend

Qualitative Ranking; A1-Best, D4-Worst



Map 8 - "INNOVATIVE HUMAN CAPITAL - STRUCTURE"
(see Annex1 - A.1.3.2)

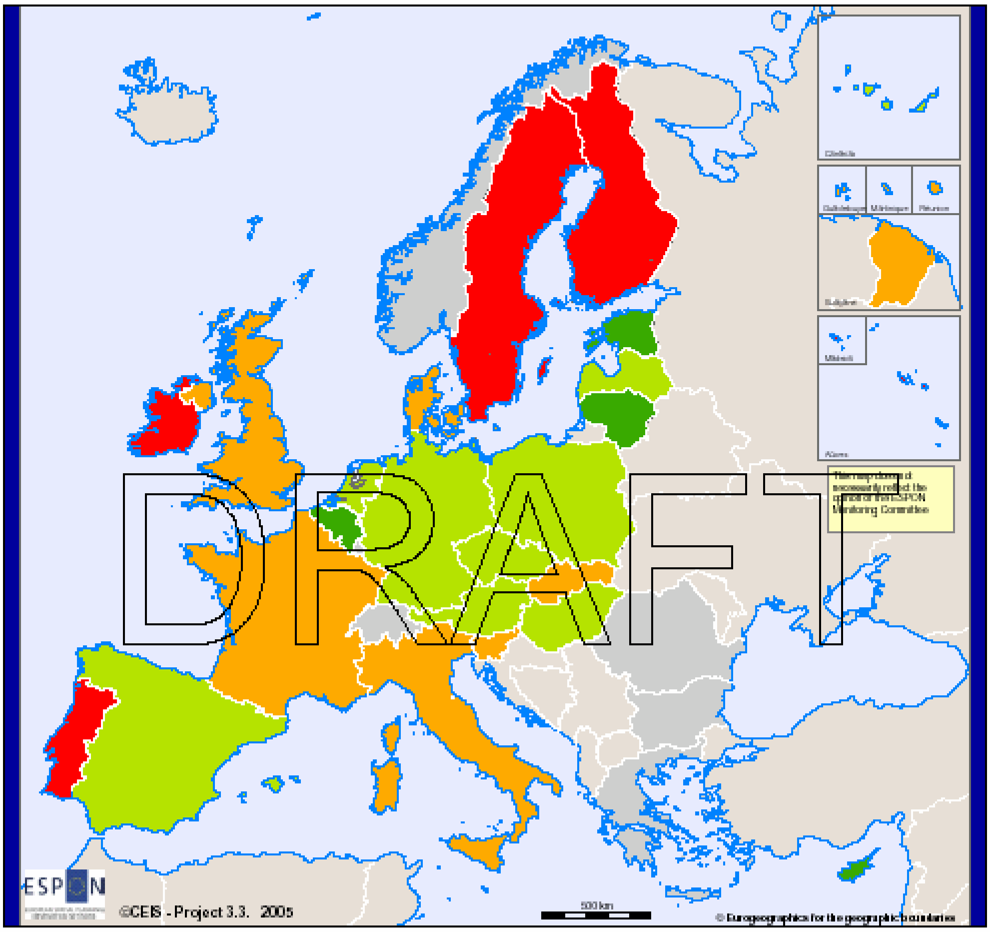


Legend

IHC - STRUCTURE

- 1, 0
- 0, 0
- 1, 1
- 0, 1
- No Data

Map 9 - "INNOVATIVE HUMAN CAPITAL - EDUCATION"
(see Annex1 - A.1.3.1)

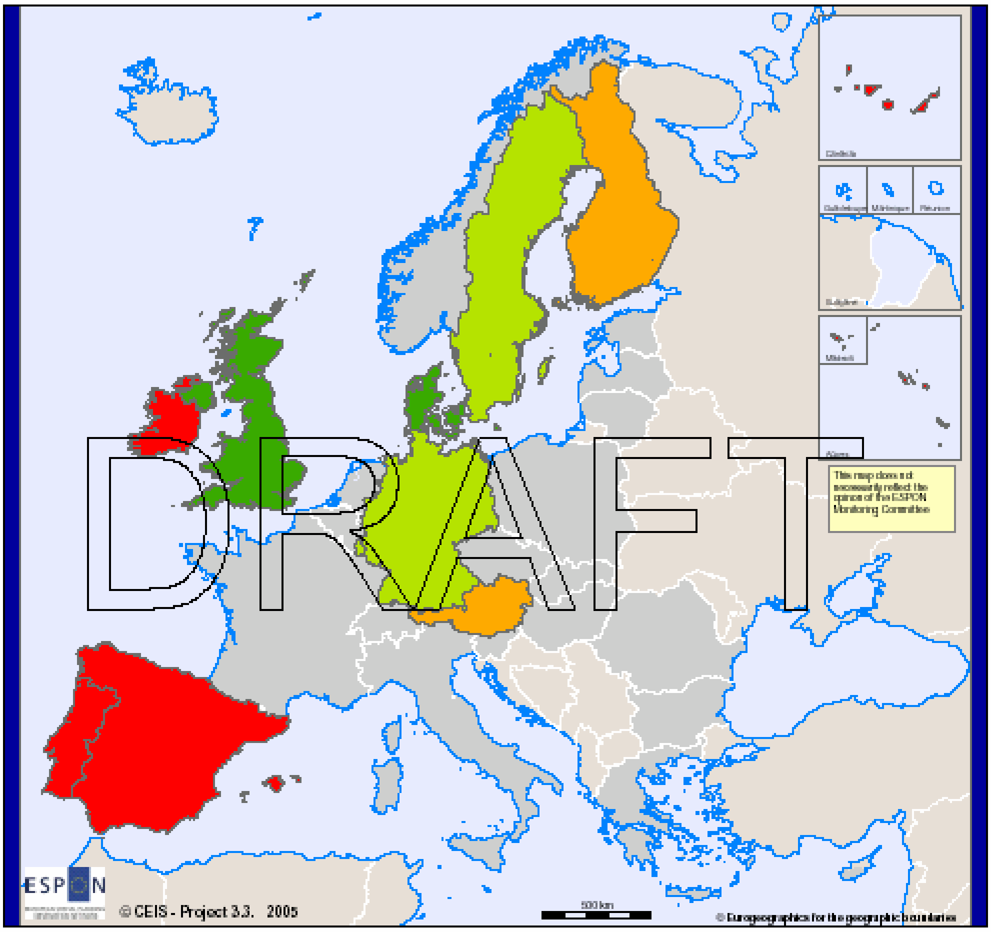


Legend

IHC - EDUCATION

- RANK 4 - 0.57503 - 0.75465
- RANK 3 - 0.75466 - 0.96384
- RANK 2 - 0.96385 - 1.17303
- RANK 1 - 1.17304 - 1.31550
- No Data

Map 10 - "Knowledge and Information Society" (see Annex1 - A.1.1)

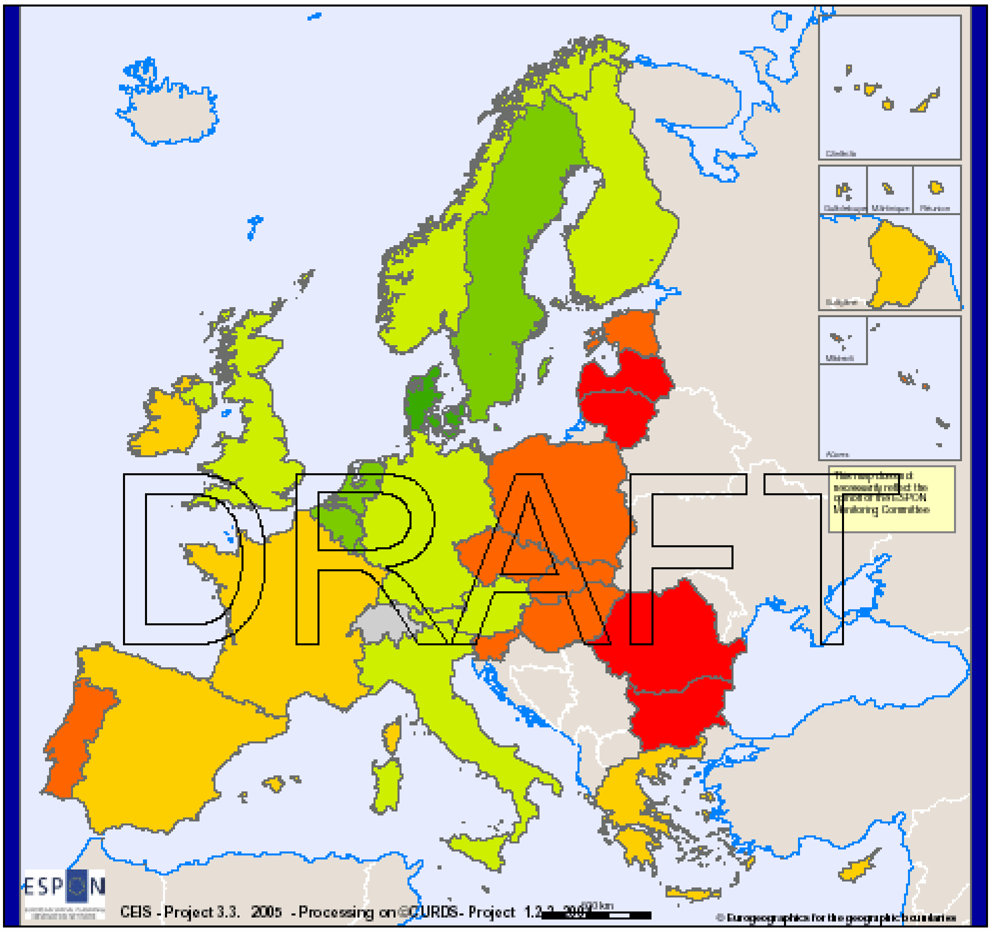


Legend

KIS (distance)

- 0.333330 - 0.775353
- 0.775354 - 1.220827
- 1.220828 - 1.596800
- 1.596801 - 1.787434

Map 11 - "TECHNOLOGICAL EQUIPMENT" (see Annex1 - A.1.2)

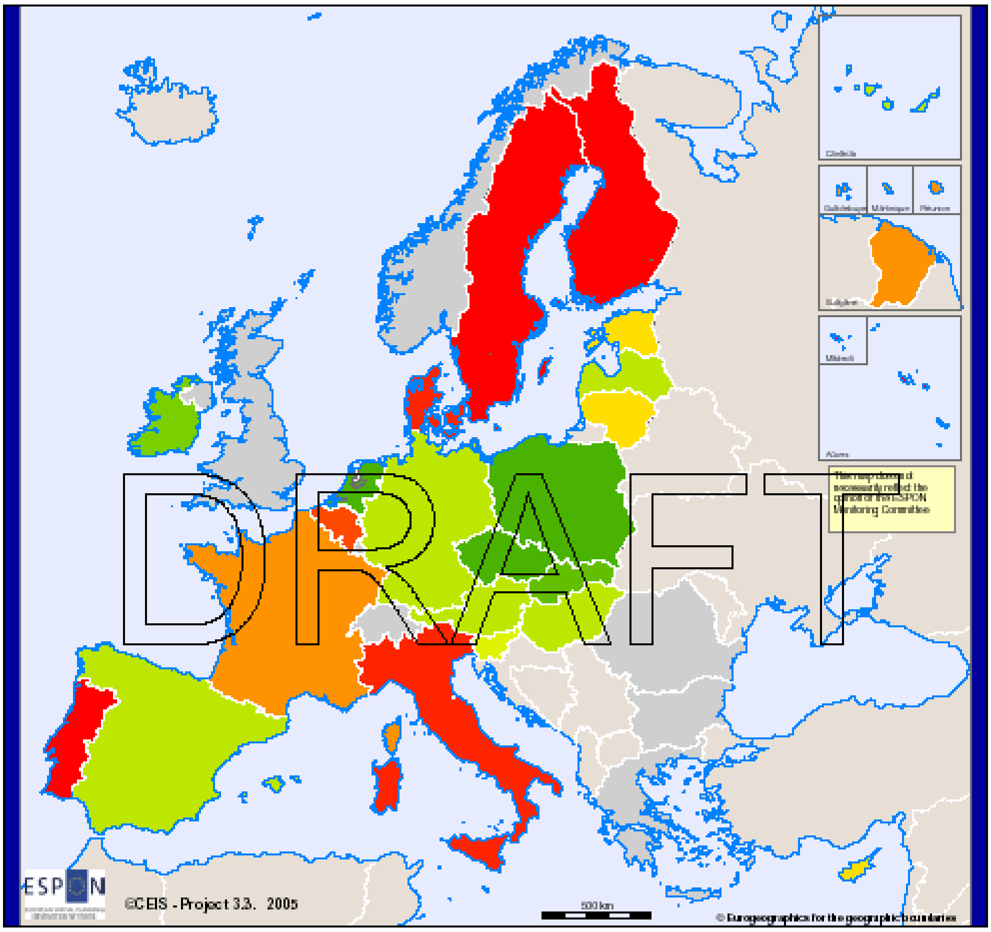


Legend

LEVEL OF TELECOMMUNICATION DEVELOPMENT

- Highly advanced
- Advanced
- Moderately advanced
- Moderate
- Lagging
- Highly lagging
- No Data

Map 12 - "HUMAN RESOURCES" (see Annex1 - A.1.3)



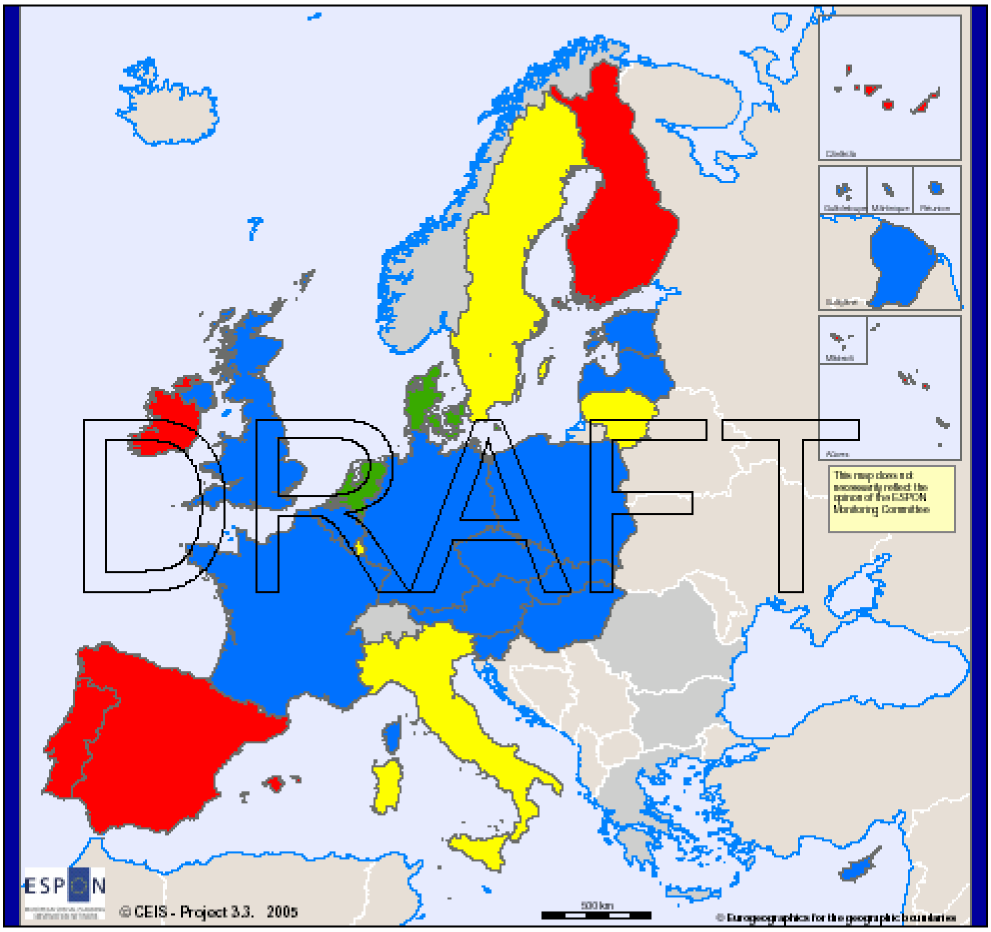
Legend

QUALITATIVE RANKING: A1-Best; D4-Worst

A2 A3 A4 B2 B3 C1 C3 D1 D3 D4

No Data

Map 13 - "INNOVATION & RESEARCH"
(see Annex1 - A.1)

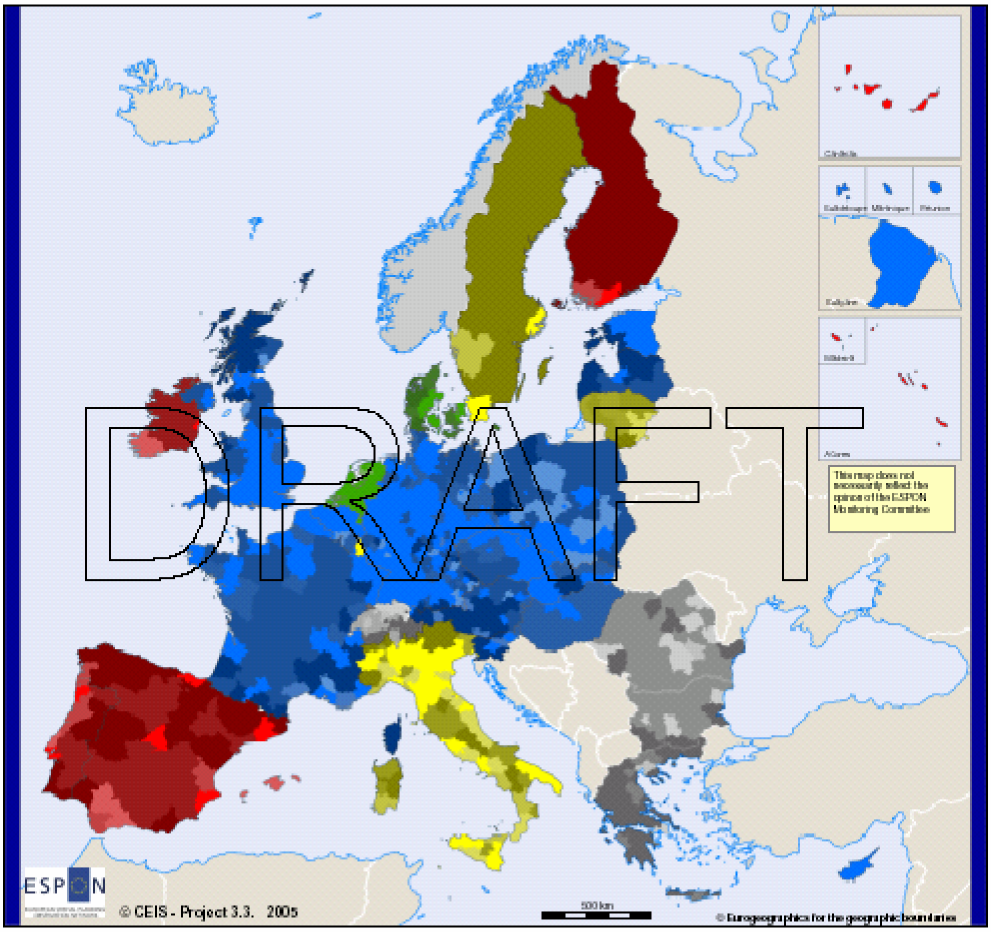


Legend

DETERMINANT: INNOVATION & RESEARCH (distance)

- 0.99107 - 1.16065 Very Good
- 1.16066 - 1.42798 Good
- 1.42799 - 1.69374 Average
- 1.69375 - 2.13599 Low

Map 14 - "INNOVATION & RESEARCH"
(see Annex1 - A.1)



Legend

URBAN-RURAL TYPOLOGY (opacity)

- High urban influence, high human intervention
- High urban influence, medium human intervention
- High urban influence, low human intervention
- Low urban influence, high human intervention
- Low urban influence, medium human intervention
- Low urban influence, low human intervention

DETERMINANT: INNOVATION & RESEARCH

- 0.99107 - 1.16065 Very Good
- 1.16066 - 1.42798 Good
- 1.42799 - 1.69374 Average
- 1.69375 - 2.13599 Low

Note: Urban-Rural typology of remote regions unknown

ESPON

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ESPON Project nr. 3.3

Territorial dimension of the Lisbon-Gothenburg strategy

SIR Appendix 1: Ranking according to indicators

31 march 2005

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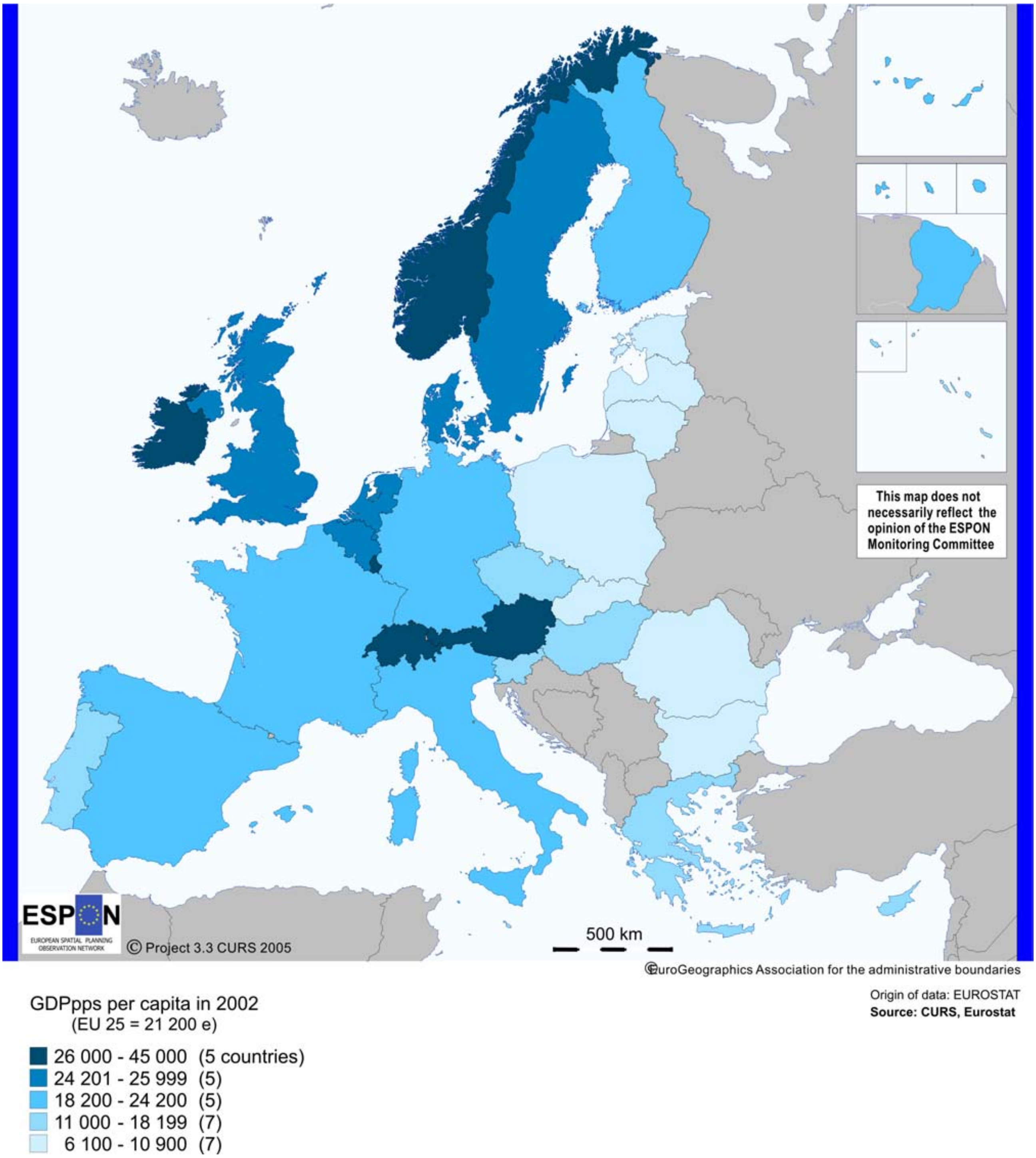
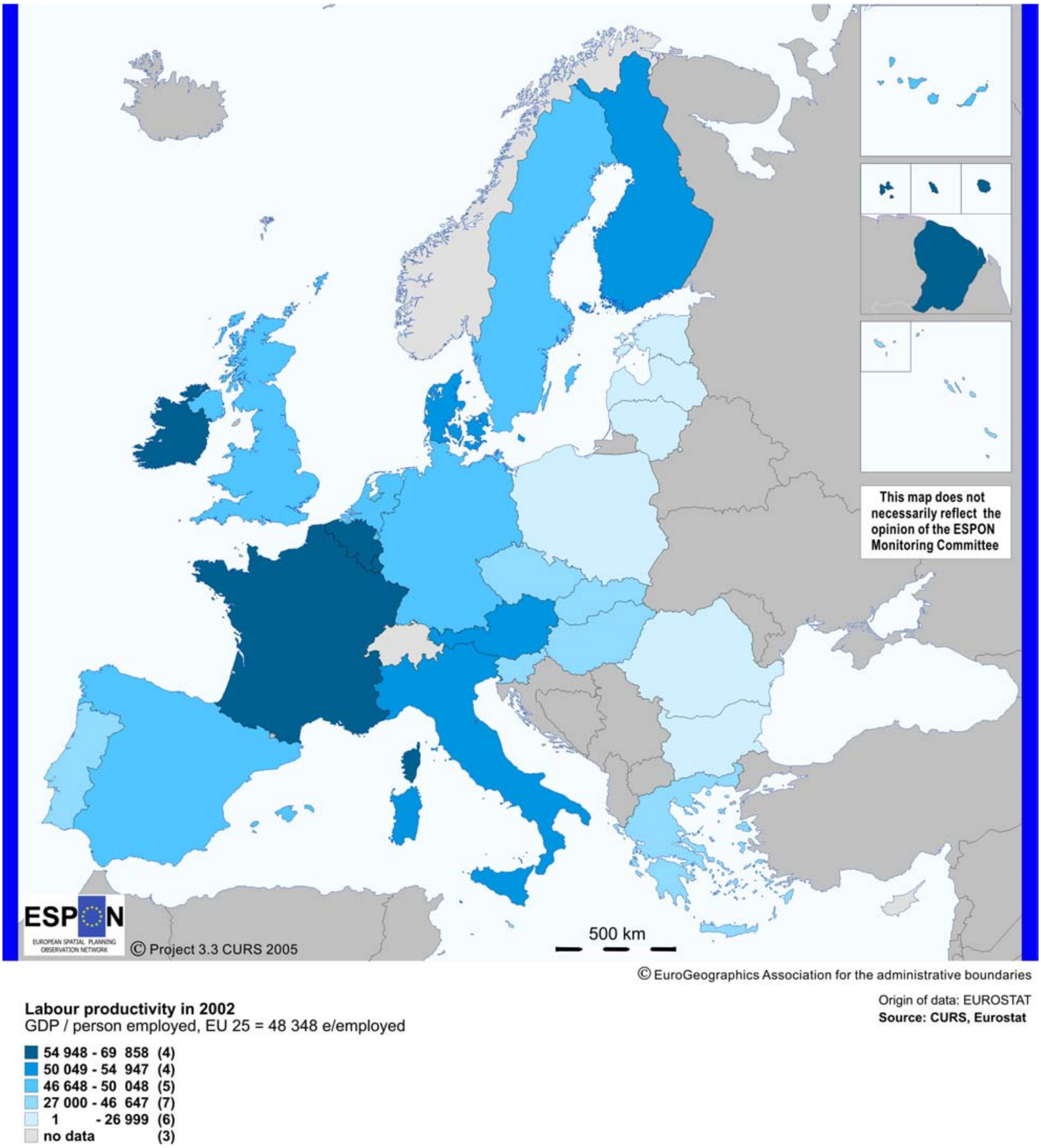
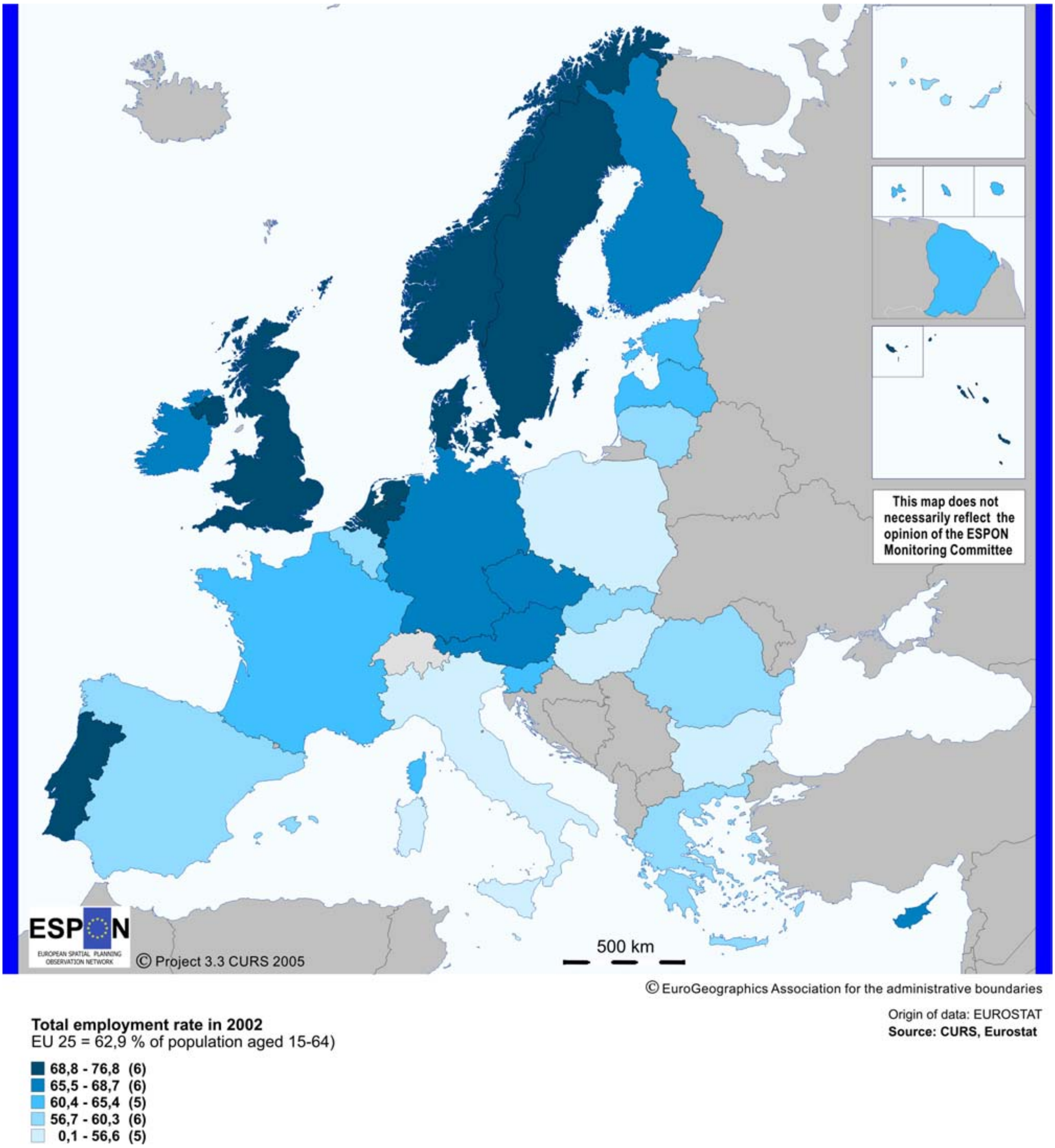
List of maps:



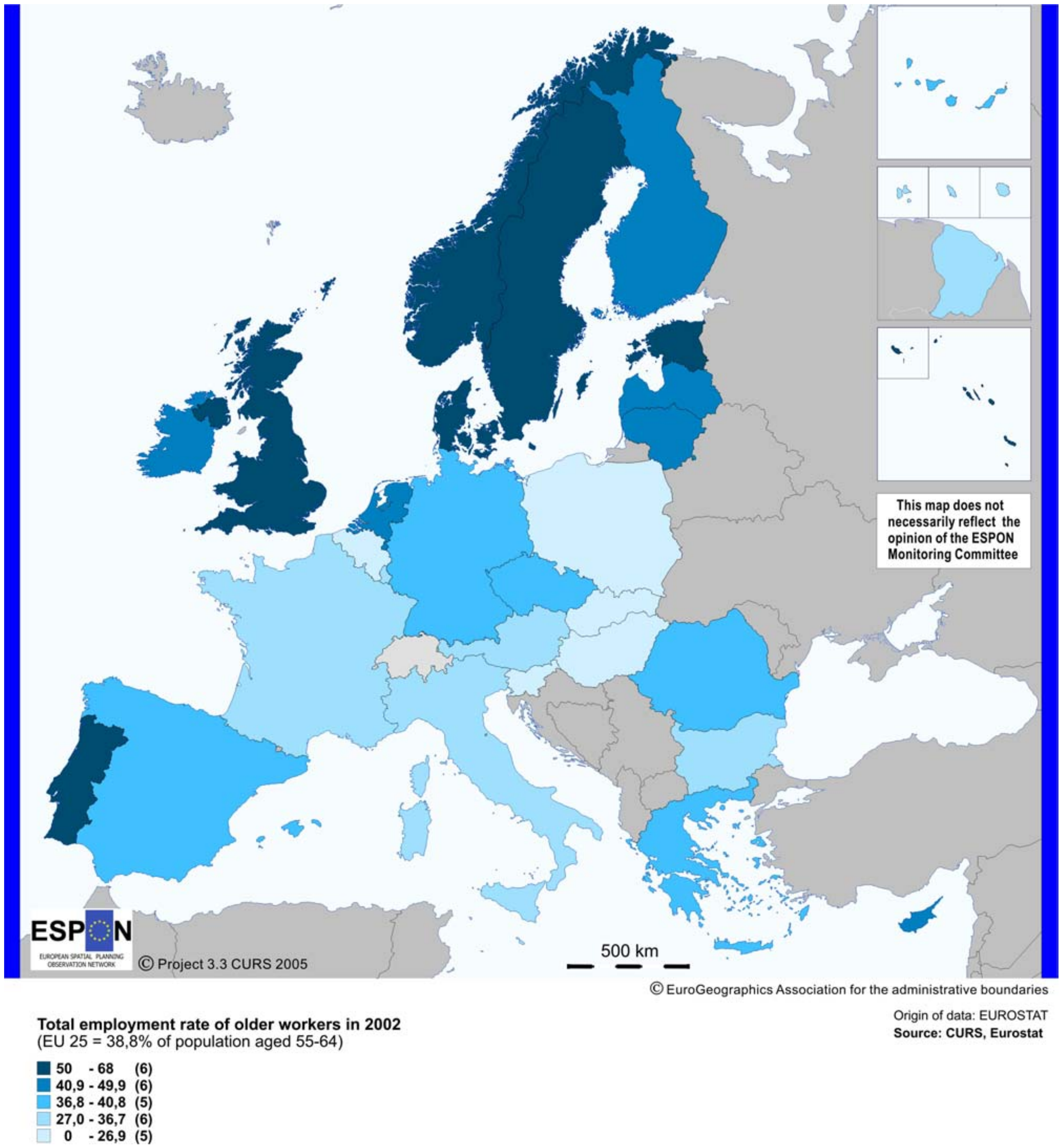
Map 1. GDP_{PPS} per capita in 2002.



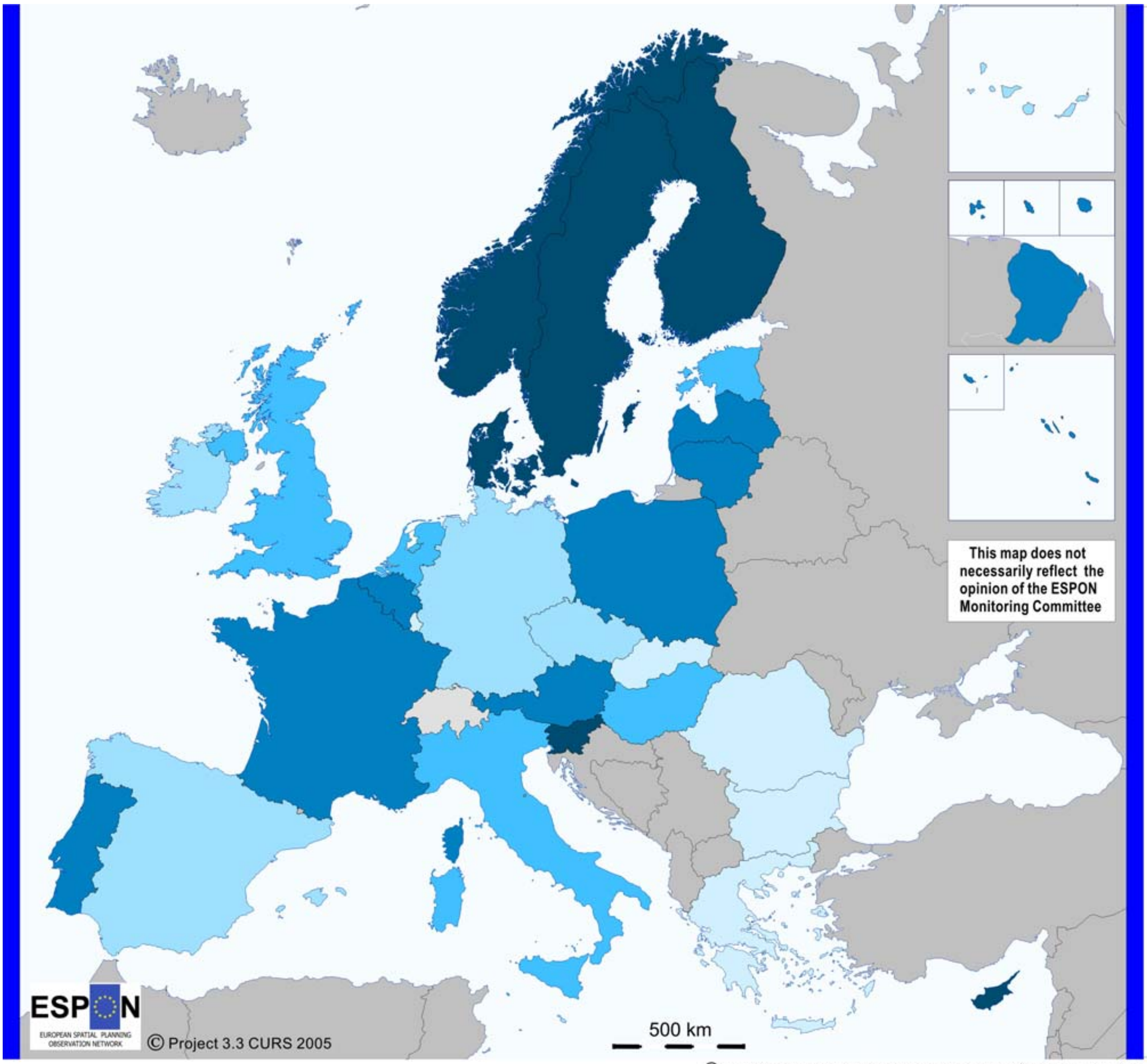
Map 2. Labour productivity in 2002.



Map 3. Employment rate in 2002.



Map 4. Employment rate of older workers in 2002.



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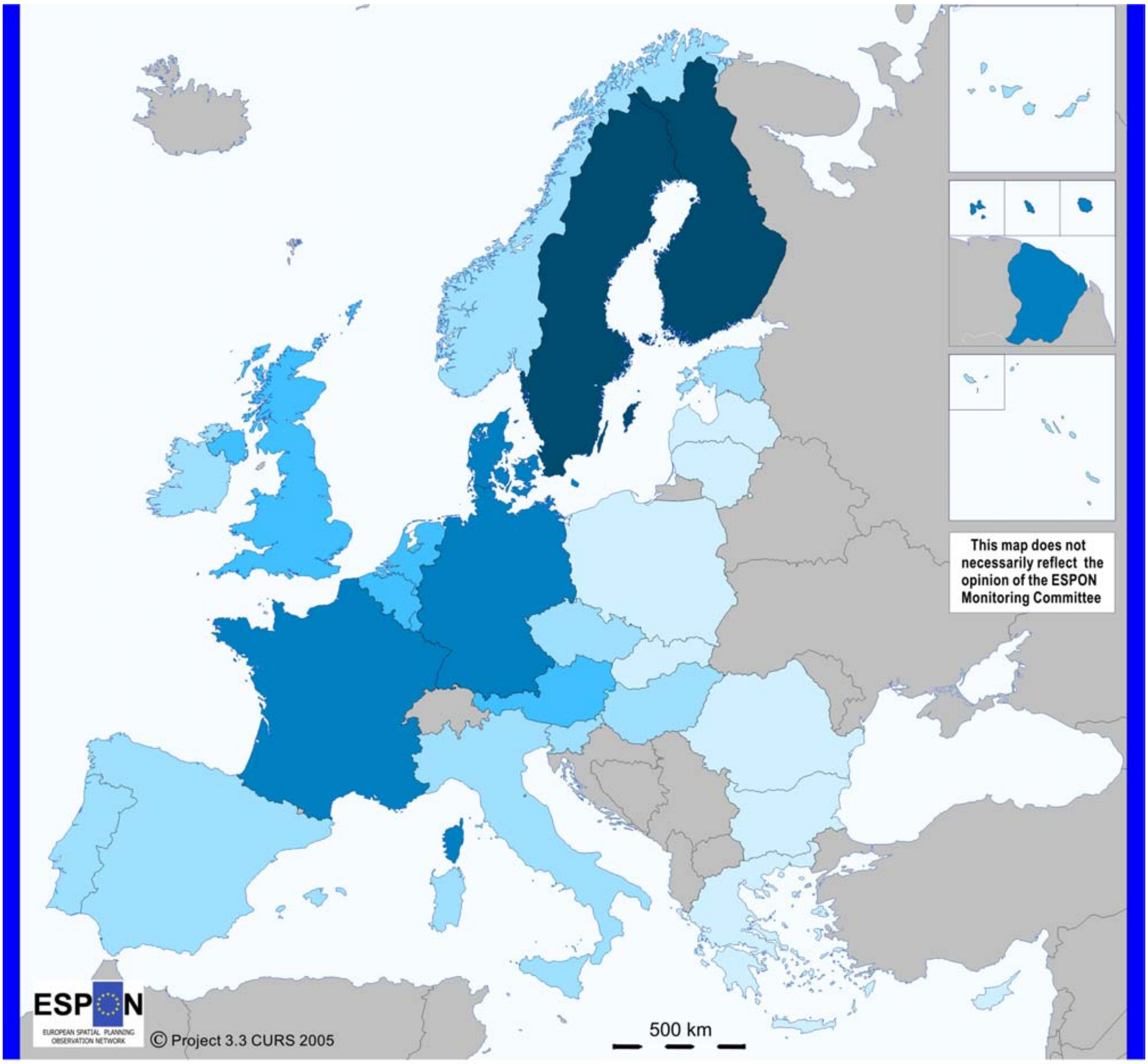
Expenditure on education in 2001
(EU 25 = 5,1% of GDP)

- **6,12 - 8,5 (6)**
- **5,56 - 6,11 (7)**
- **4,65 - 5,55 (5)**
- **4,10 - 4,64 (5)**
- **3,28 - 4,0 (5)**

Origin of data: EUROSTAT
Source: CURS, Eurostat

Map 5. Expenditure on education in 2001.

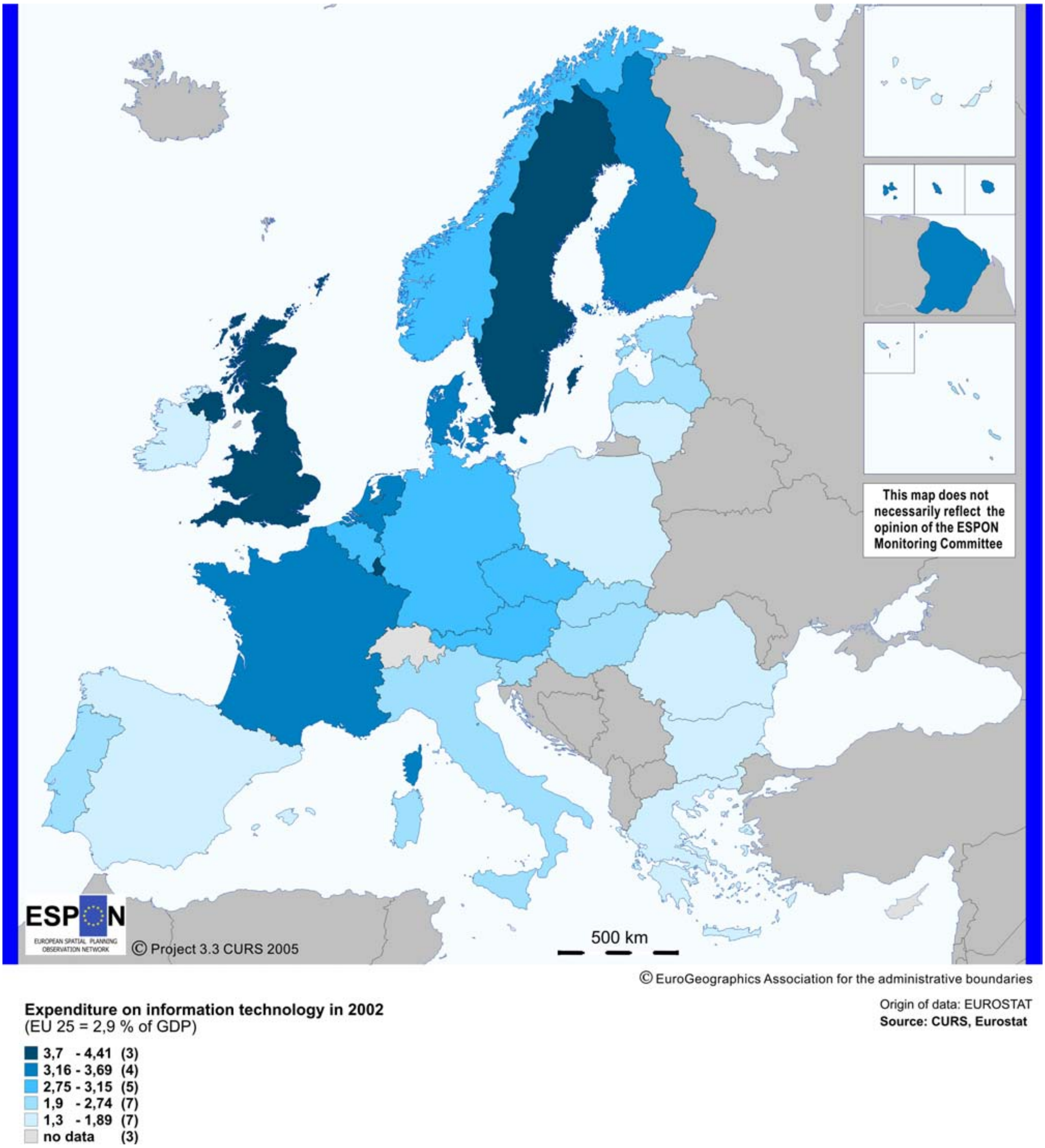


Expenditure on research & development in 2001
(EU 25 = 1,92 % of GDP)

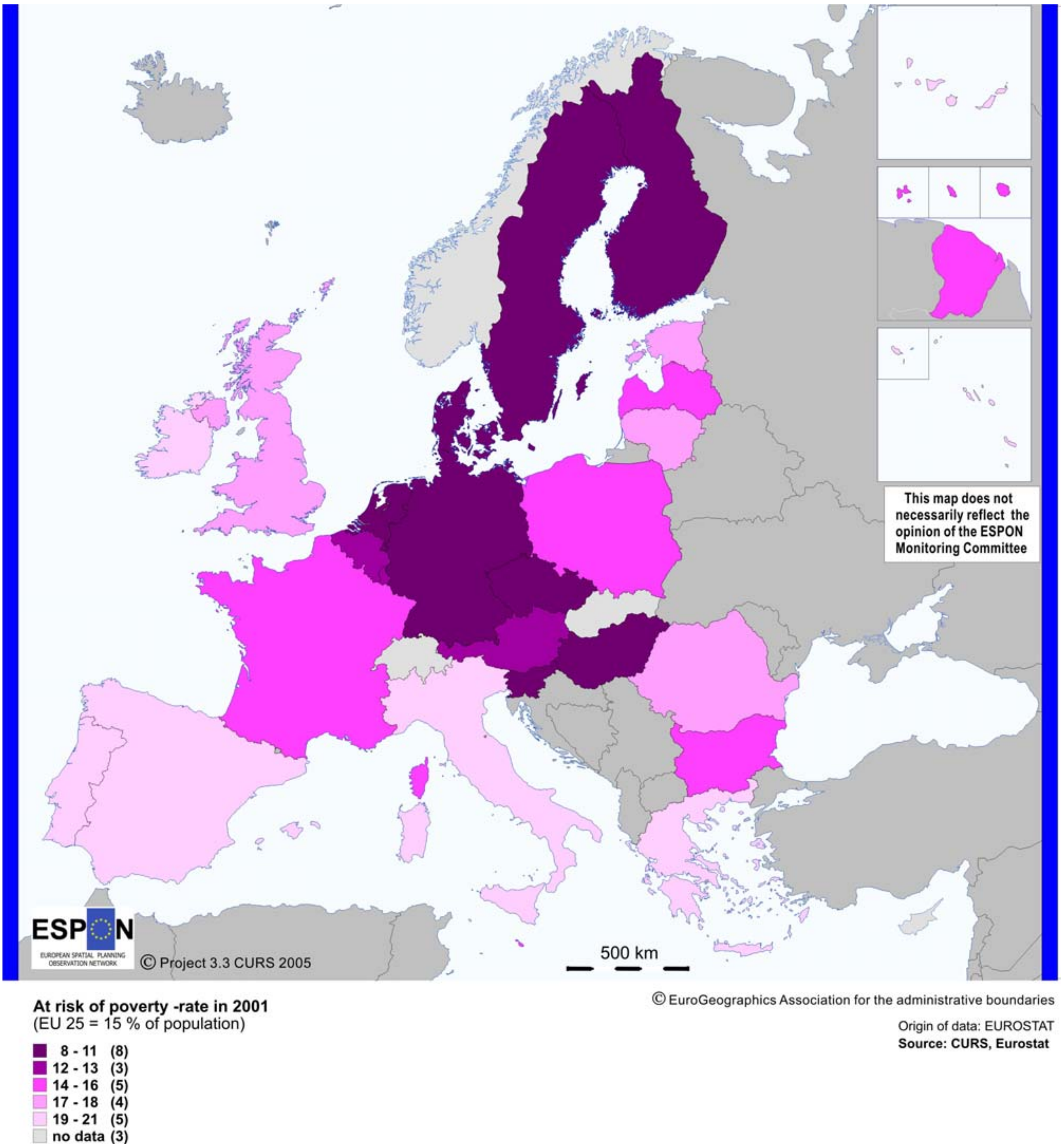
- 3 - 4,27 (2)
- 2,22 - 2,9 (3)
- 1,65 - 2,21 (5)
- 0,7 - 1,64 (9)
- 0,1 - 0,69 (8)

Origin of data: EUROSTAT
Source: CURS, Eurostat

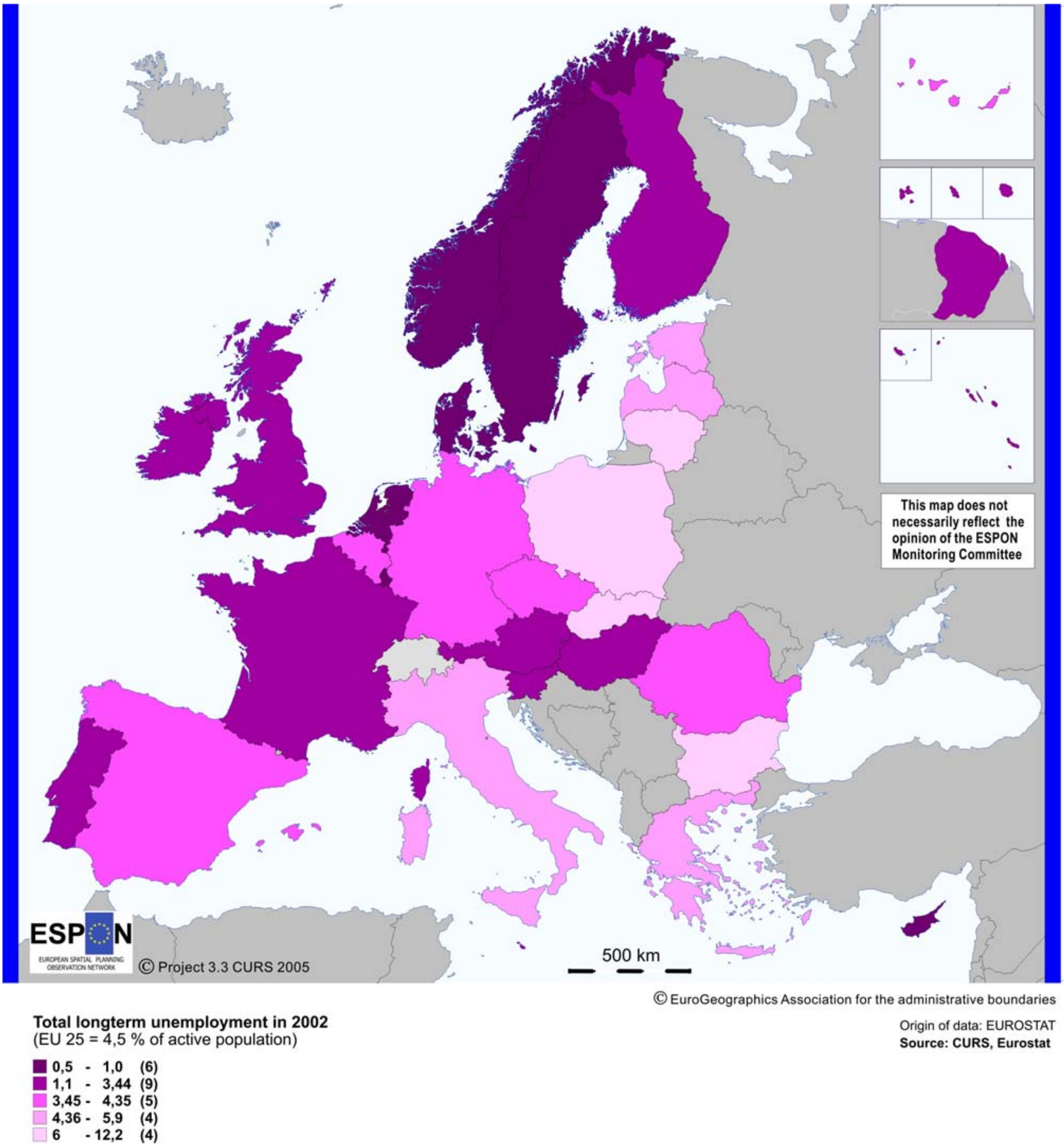
Map 6. Expenditure on research & development in 2001.



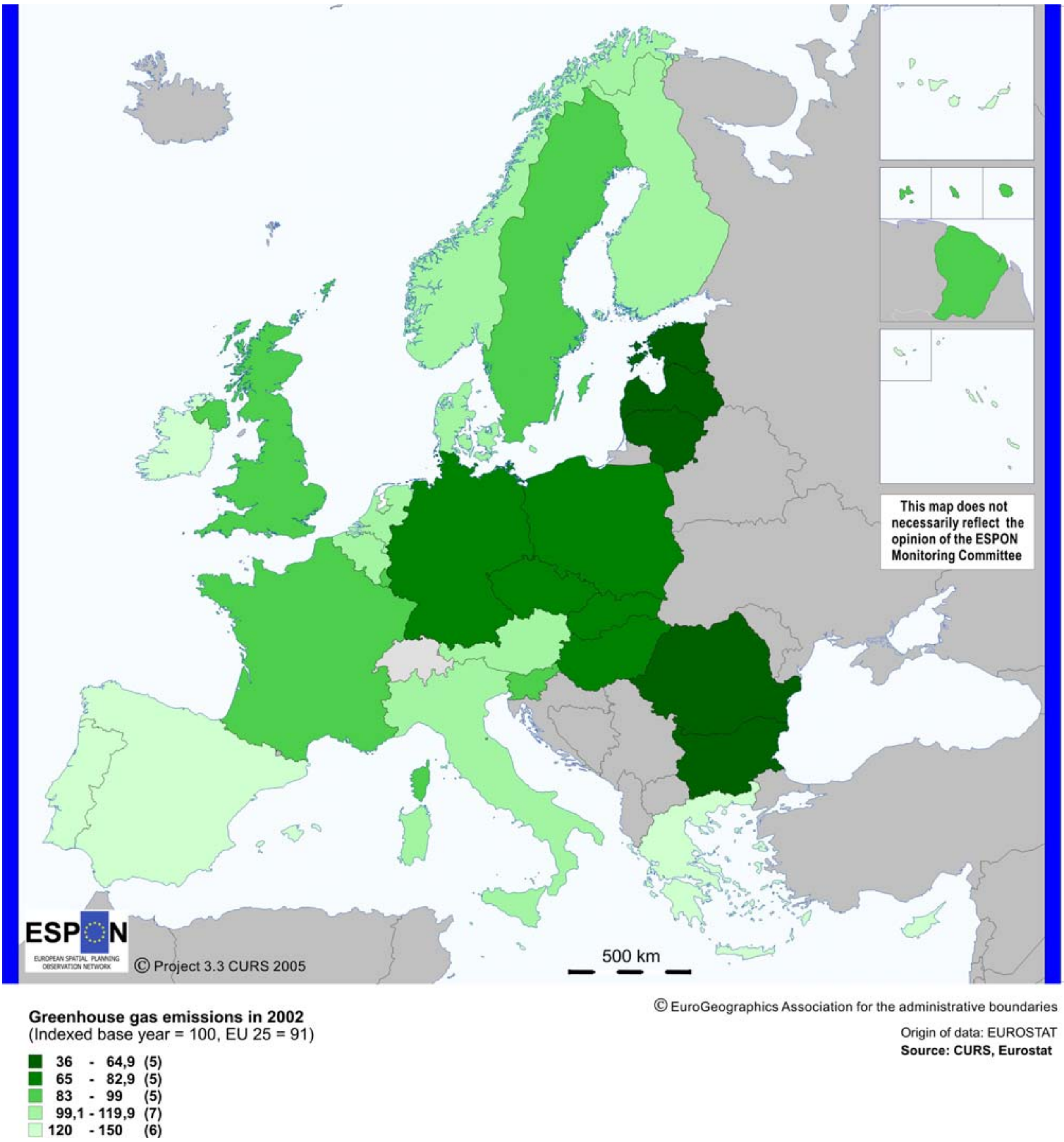
Map 7. Expenditure on information technology in 2002.



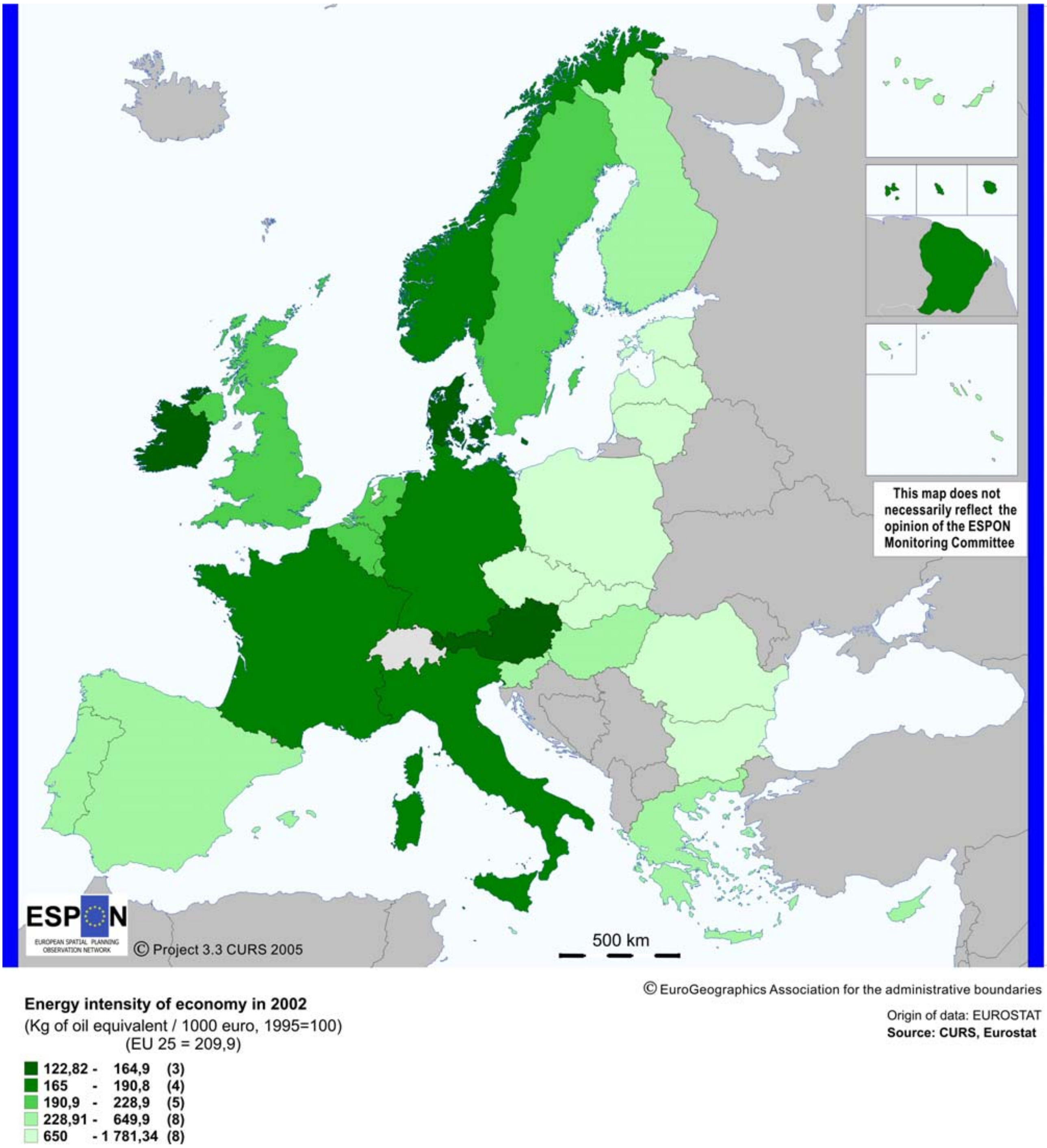
Map 8. At-risk-of-poverty -rate in 2001.



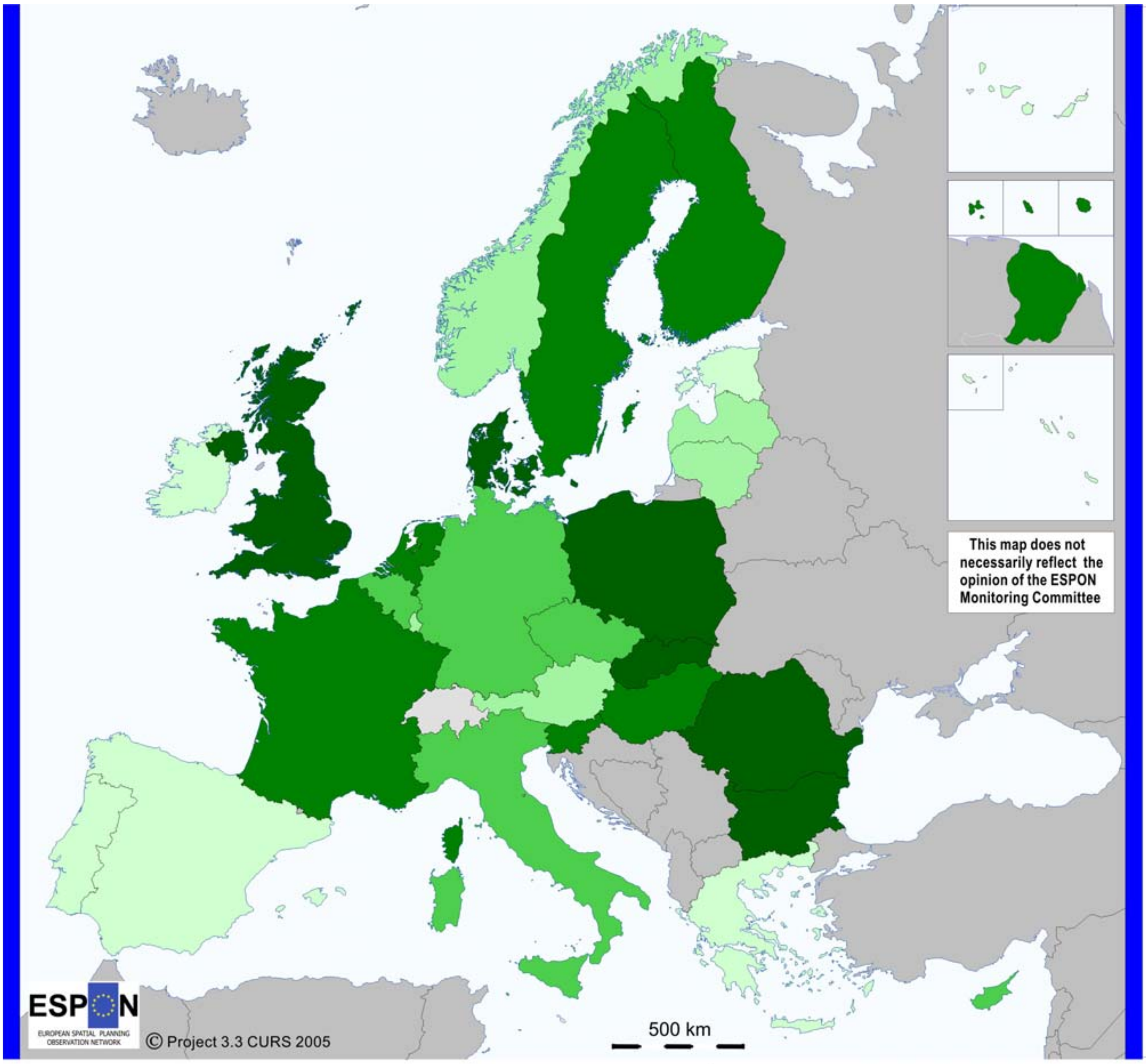
Map 9. Longterm unemployment rate in 2002.



Map 10. Greenhouse gas emissions in 2002.



Map 11. Energy intensity of economy in 2002.



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Volume of freight transport in 2002
(tonne-km / GDP, 1995=100)
(EU 25 = 100,6)

- **33,2 - 90,2 (6)**
- **90,3 - 95,6 (6)**
- **95,7 - 105,5 (5)**
- **105,51 - 124,4 (5)**
- **124,5 - 174,8 (5)**
- **no data (1)**

Origin of data: EUROSTAT
Source: CURS, Eurostat

Map 12. Volume of freight transport in 2002.

European Spatial Planning Observation Network

ESPON Project nr. 3.3

Territorial dimension of the Lisbon-Gothenburg strategy

SIR Appendix 2:

Ranking according to sum of indicators /environmental, social, economical

31 march 2005

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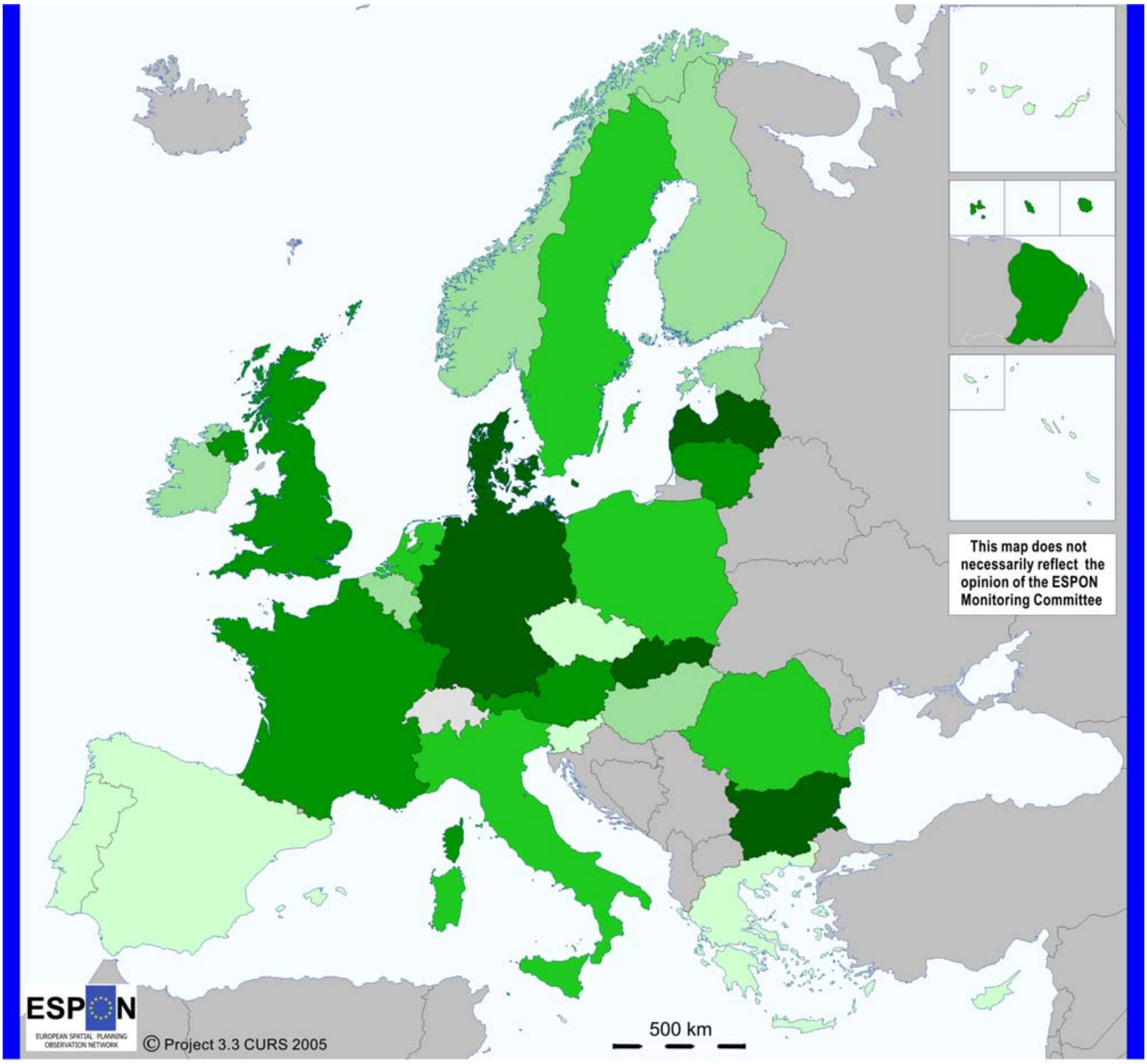
List of maps:

13. Environmental indicators
14. Social indicators
15. Economic indicators
16. Summary of indicator blocks (environmental, social, economical)



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Origin of data: EUROSTAT
Source: CURS, Eurostat

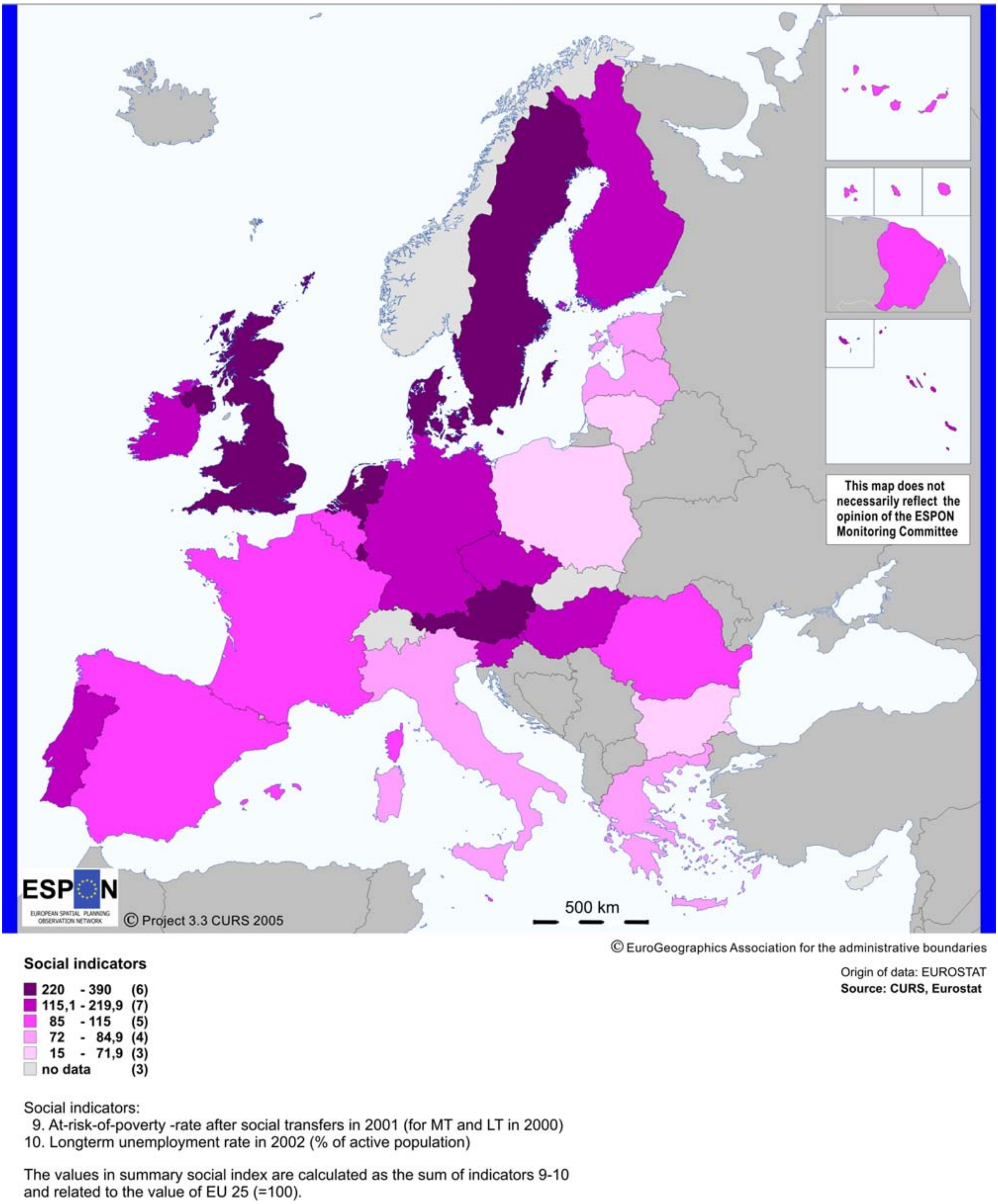
Environmental indicators

- 112 - 173,9 (5)
- 102,1 - 111,9 (5)
- 98 - 102 (5)
- 88 - 97,9 (6)
- 49,6 - 87,9 (6)
- no data (1)

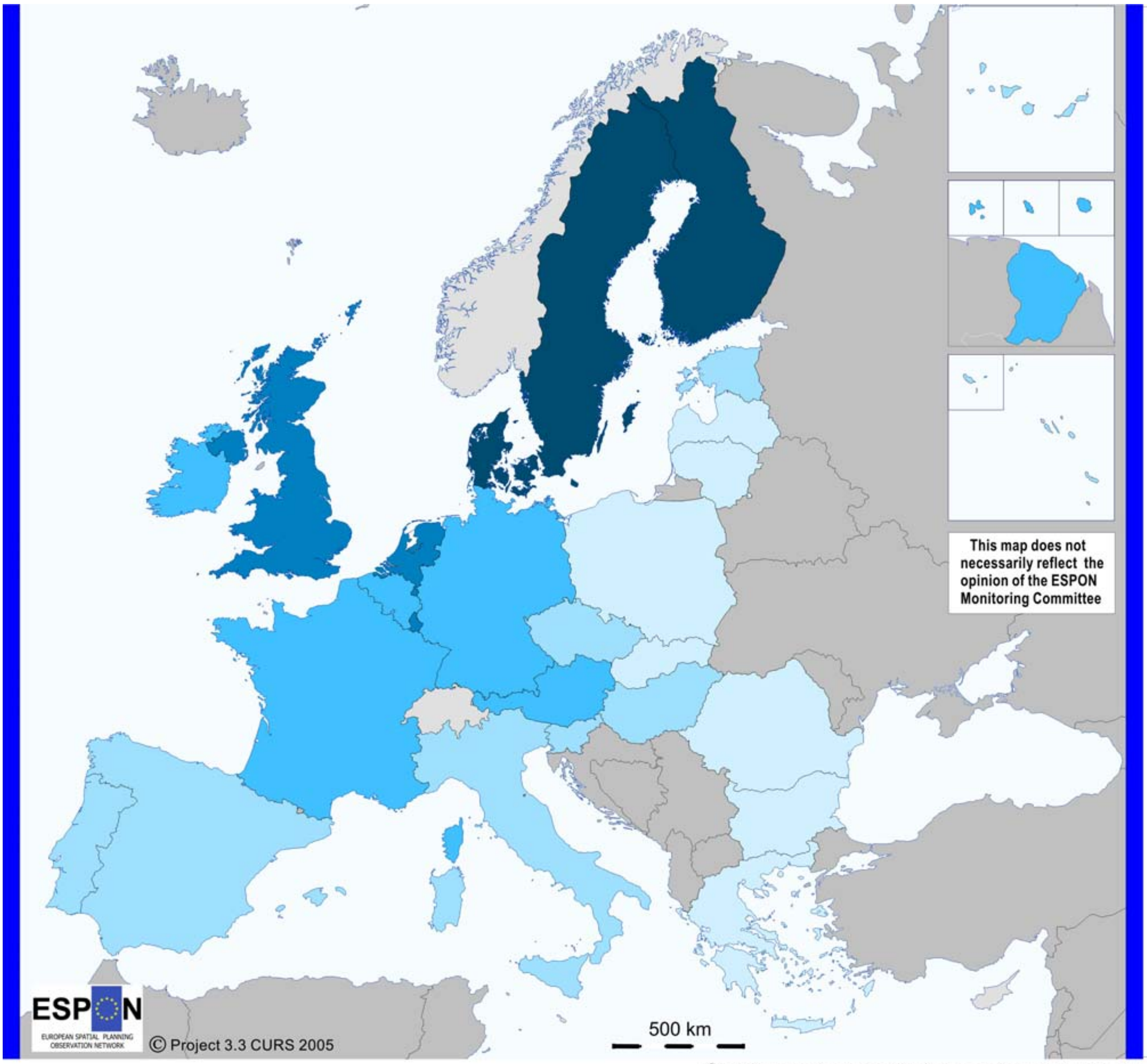
Environmental indicators:
12. Greenhouse gas emissions in 2002 (for CY in 2000) (indices related to base year)
13. Energy intensity of economy in 2002
(index for the gross inland consumption of energy / GDP, year 1995=100)
14. Volume of freight transport in 2002 (Index for transport as tonne-km/GDP, year 1995=199)

The values in summary social index are calculated as the sum of indicators 12, 13 and 14 and related to the value of EU 25 (=100).

Map 13. Environmental indicators.



Map 14. Social indicators.



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Economy

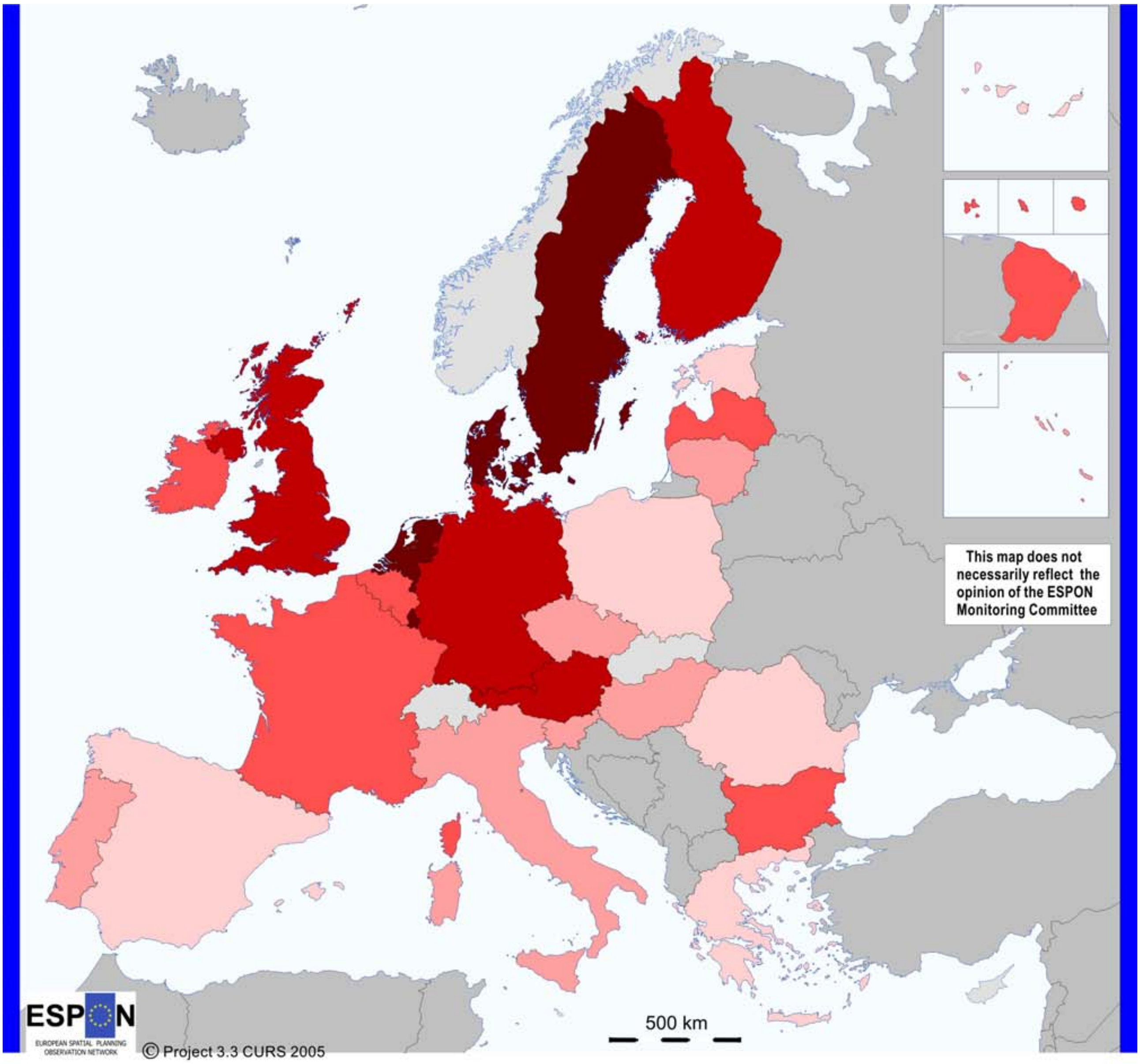
121 - 146,3	(3)
109,6 - 120,9	(3)
90,5 - 109,5	(5)
71 - 90,4	(7)
52 - 70,9	(7)
no data	(3)

Economic indicators:
1. GDPpps/capita in 2002
2. Labour productivity in 2002 (GDPpps/employed)
3. Employment rate in 2002
4. Employment rate of older workers (aged 55-64) in 2002
5. Expenditure on education (% of GDP) in 2001
6. Expenditure on research & development (% of GDP) in 2001
7. Expenditure on information technology (% of GDP) in 2002

Origin of data: EUROSTAT
Source: CURS, Eurostat

The values in summary economy index are calculated as the sum of indicators 1-7 and related to the value of EU 25 (=100).

Map 15. Economic indicators.



Summary index of indicator blocks

- 163 - 210,1 (4)
- 115,1 - 162,9 (4)
- 85 - 115,0 (5)
- 75 - 84,9 (6)
- 35,1 - 74,9 (5)
- no data (0)

The summary (S) of indicator blocks is calculated with following formula:

S = Environment * (Social + Ecnomy)
= (12+13+14) * ((9+10) + (1+2+3+4+5+6+7))

The index values are related to the summary value of EU 25 (= 100).

Indicator Blocks:

Economic indicators:
1. GDPpps/capita in 2002
2. Labour productivity in 2002 (GDPpps/employed)
3. Employment rate in 2002
4. Employment rate of older workers (aged 55-64) in 2002
5. Expenditure on education (% of GDP) in 2001
6. Expenditure on research & development (% of GDP) in 2001 (for LU in 2000)
7. Expenditure on information technology (% of GDP) in 2002

Social indicators:
9. At-risk-of-poverty -rate after social transfers in 2001 (for MT and LT in 2000)
10. Longterm unemployment rate in 2002 (% of active population)

Environmental indicators:
12. Greenhouse gas emissions in 2002 (for CY in 2000) (indices related to base year)
13. Energy intensity of economy in 2002
(index for the gross inland consumption of energy / GDP, year 1995=100)
14. Volume of freight transport in 2002 (Index for transport as tonne-km/GDP, year 1995=199)

Origin of data: EUROSTAT
Source: CURS, Eurostat

Map 16. Summary of indicator blocks (environmental, social, economical).

ESPON

European Spatial Planning Observation Network

ESPON Project nr. 3.3

Territorial dimension of the Lisbon-Gothenburg strategy

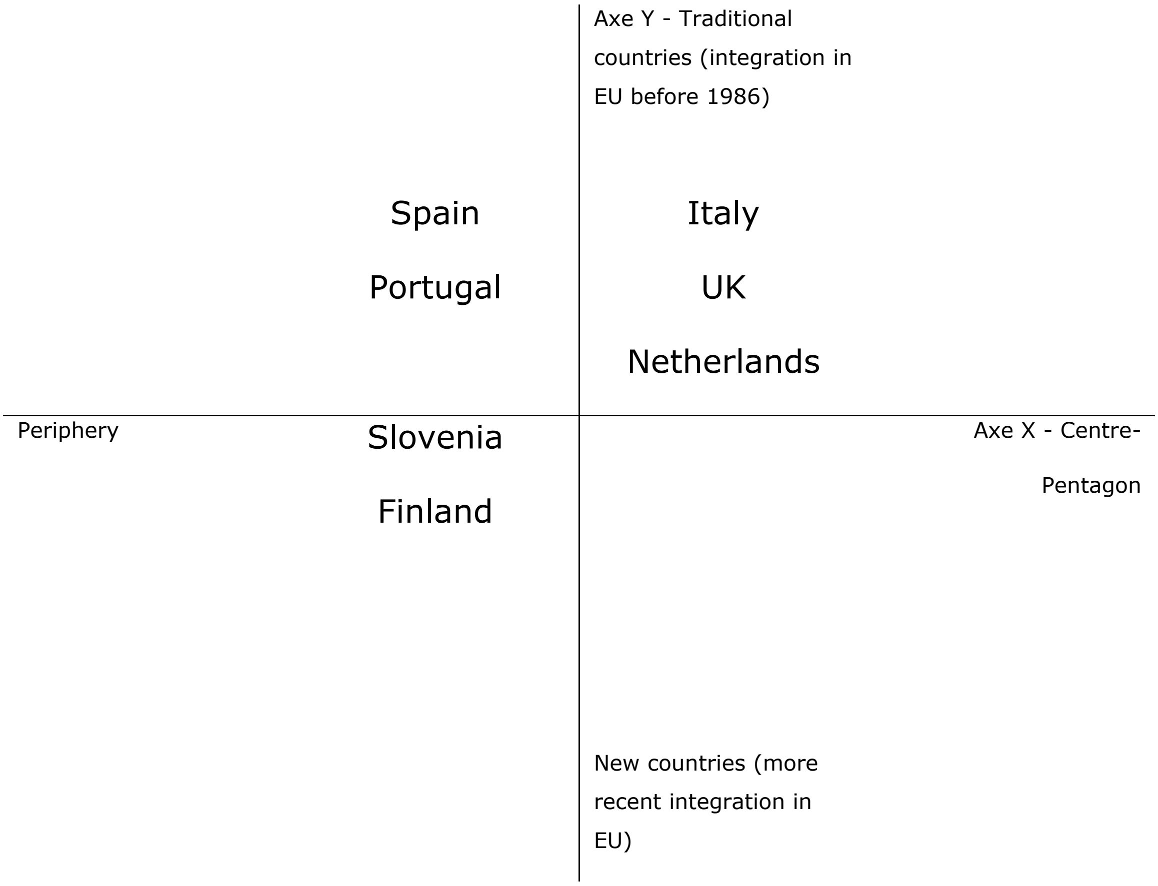
SIR Appendix 3-6: The case studies

31 march 2005

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

APPENDIX 3

Countries participating in the network of ESPON Project 3.3.



APPENDIX 4

Brief overview of the typologies presented in the ESPON Programme

Of the series of typologies presented in the ESPON Programme, two whose spatial dimensions are most evident stand out and, for this reason, they were chosen as the starting point in choosing the case studies. They are Project 1.1.1 - “The role, specific situation and potentials of urban areas as nodes in a polycentric development” (2002-2004) and Project 1.1.2 – “Urban-rural relations in Europe” (2002-2004).

ESPON Project 1.1.1 - “The role, specific situation and potentials of urban areas as nodes in a polycentric development” (2002-2004) identifies 1595 Functional Urban Areas (FUAs) with more than 50,000 inhabitants, of which 149 are metropolitan areas and 76 were classified as *Metropolitan European Growth Areas* (MEGAs). The *Pentagon*, defined as the centre of Europe (delimited by London, Hamburg, Munich, Milan and Paris), is part of these MEGAs.

Table 1. Classification of the 76 MEGAs

MEGA - Global Nodes	*Category1 European Engines*	*Category 2 Strong MEGAs*	*Category 3 Potential MEGAs*	*Category 4 Weak MEGAs*
London **Paris**	Amsterdam Barcelona Berlin Brussels Copenhagen Frankfurt Hamburg Madrid Milan	Athens Cologne Dublin Düsseldorf Geneva Gothenburg Helsinki Manchester Oslo	Aarhus Antwerp Bergen Edinburgh Glasgow Birmingham Palma de Mallorca Bern Bilbao	Bordeaux Bucharest Cork Gdansk- Gdynia Genoa Katowice Krakow Le Havre

	Munich Rome Stuttgart Zurich	Stockholm Vienna	Bologna Bratislava Bremen Budapest Lille Lisbon Luxembourg Lyon Malmö Marseille Nice Prague Rotterdam Toulouse Turin Valencia Warsaw	Ljubljana Lodz Naples Porto Poznan Riga Seville Sofia Southampton Szczecin Tallinn Timisoara Turku Valetta Vilnius Wroklaw

Source: ESPON Project 1.1.1.

The 76 MEGAs can be separated into five categories, which in their totality comprise the **urban system at the European scale**:

- Global nodes (2 MEGAs) – includes the largest and most competitive urban systems with high connectivity;
- European Engines (13 MEGAs) – corresponds to large, highly competitive cities, possesses strong human capital and good accessibility;
- Strong MEGAS (11 MEGAs) – includes cities that are relatively large, competitive and often possessing strong human capital;
- Potential MEGAS (26 MEGAs) – smaller, with lower competitiveness, more peripheral and weaker human capital;
- Weak MEGAS (24 MEGAs) – usually small, less competitive, more peripheral and with lower human capital figures then Potential MEGAs.

This typology includes a group of regions outside of the *Pentagon* possessing development potential and that, because of this, are capable of contributing towards the construction of a more polycentric European urban system. We are speaking here of some "Strong MEGA" and some "Potential MEGA", which should be included in the case studies sampling.

Along with the MEGAs typology that characterises the urban system at the European scale, a second index was presented that measures the potential for polycentricity based on morphological proximity, by identifying territories referred to as *Potential Urban Strategic Horizons* (PUSH)[1].

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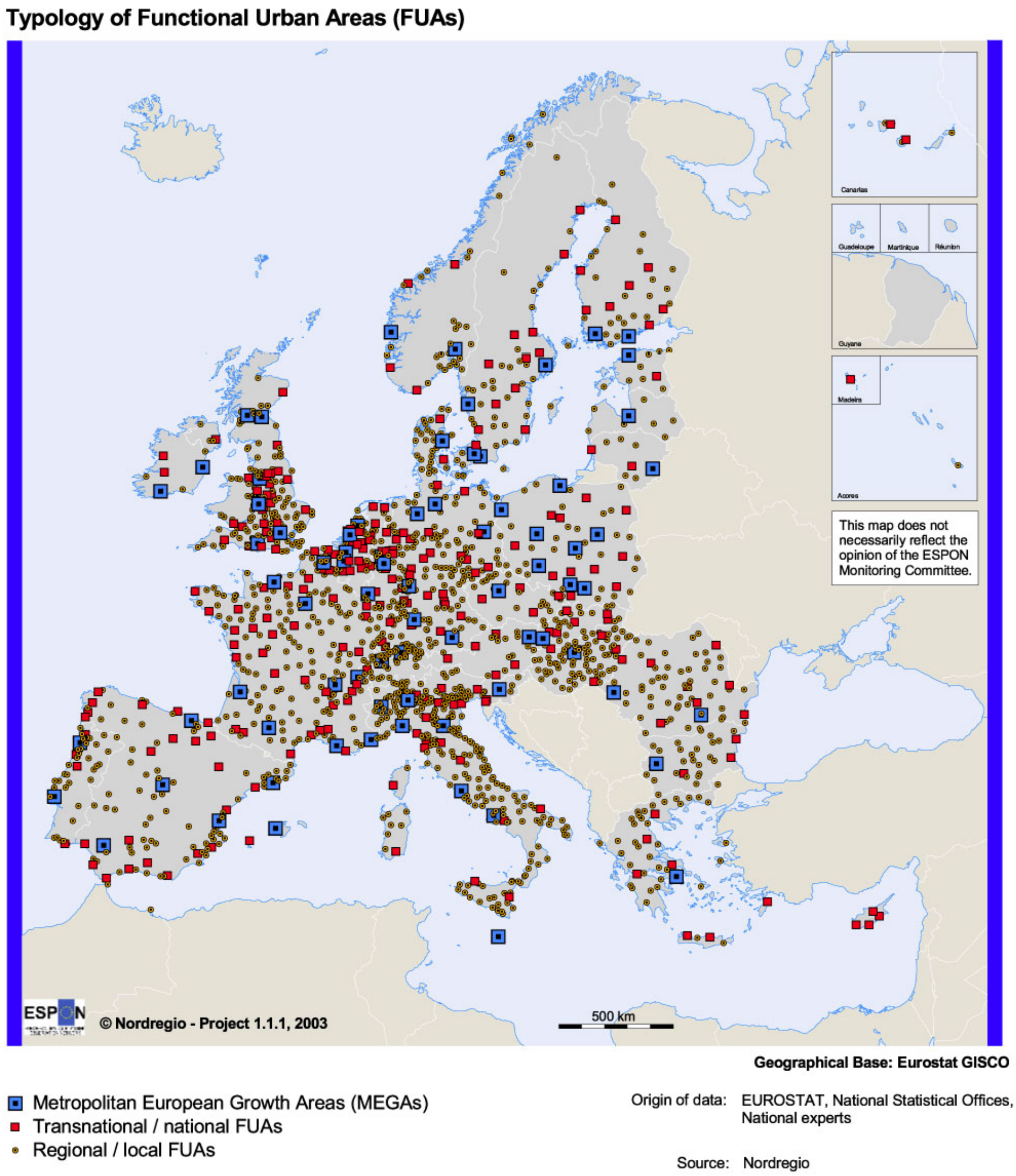
[1] For each FUA, the area reached within 45 minutes by car from a FUA centre was calculated (travel time).

Map 1

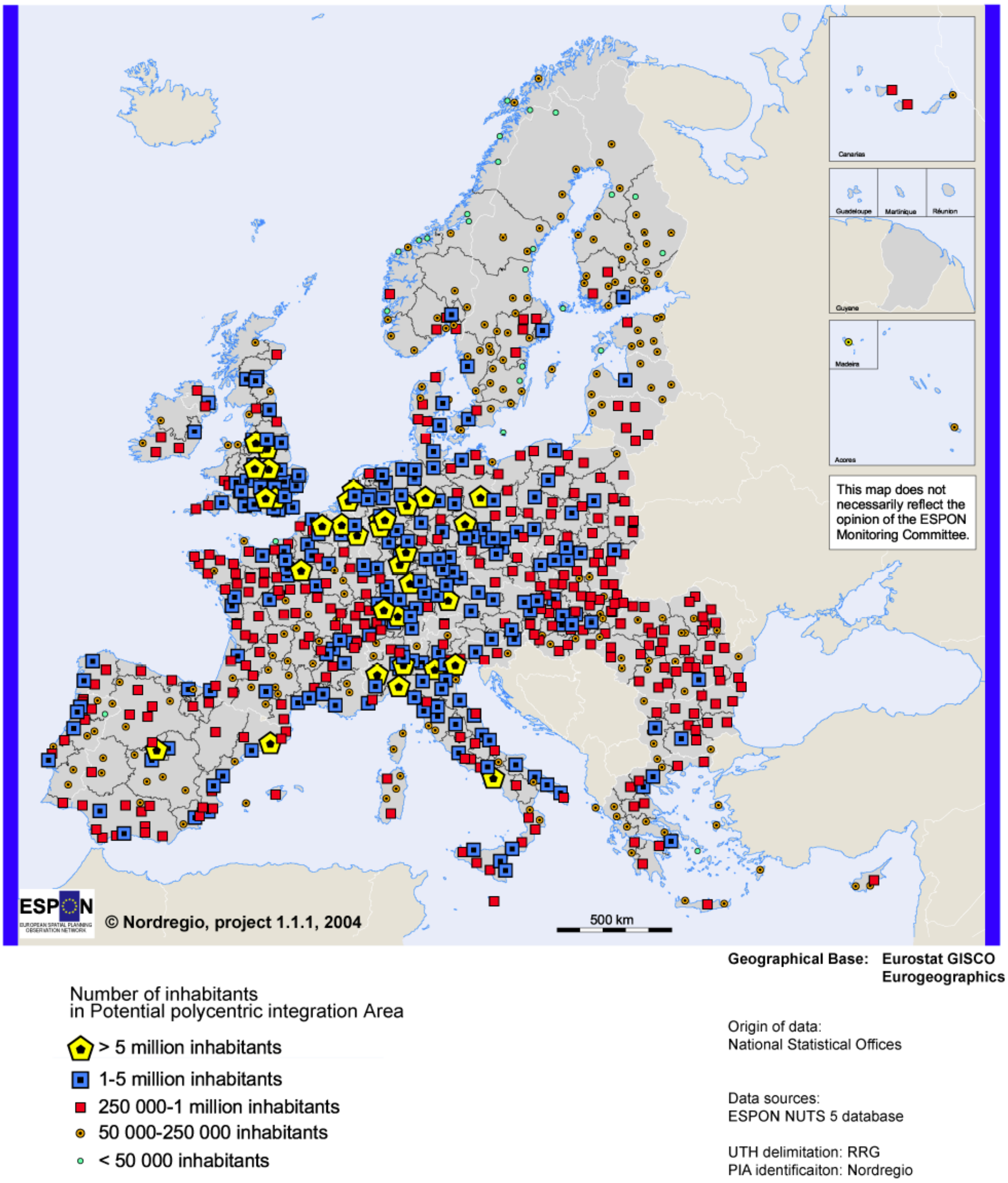


Source: Project 1.1.1. – "The role, specific situation and potentials of urban areas as nodes in a polycentric development (2002-2004)", Final Report, pp. 10

From this second index, the index identifying the Potential Polycentric Integration Areas (PIAs) was calculated. This index identifies areas of influence in the FUA in addition to illustrating the potential for functional and demographic relationships between the FUA centre and the surrounding areas, confirming that a wide range of cities could significantly increase their demographic mass and, thus, also their position in the European urban hierarchy though polycentric integration.

Map 2.

Classification of potential Polycentric Integration Areas according to total population



Source: Project 1.1.1. – "The role, specific situation and potentials of urban areas as nodes in a polycentric development (2002-2004)", Final Report, pp. 16

In this scope, the index "complements" the MEGAs typology, allowing to identify the importance of **urban centres outside the MEGAs** and their areas of influence. This is another interesting indicator to keep in mind as it illustrates the fundamental role of small and medium-sized cities in the structuring of several EU countries urban systems, namely in a meso-scale.

In defining the typology presented in Project 1.1.2. – "Urban-rural relations in Europe" (2002-2004), the following two dimensions of analysis were taken into consideration:

- the ***degree of urban influence***[2], defined according to population density and status of the leading urban centre of each NUTS3 area;
- the ***degree of human intervention***[3], measured by the relative share of land cover according to the main land cover classes of the CORINE data set (artificial surfaces, agricultural areas and residual land cover).

According to their urban-rural characteristics, the following six different regional types were identified:

1. High urban influence, high human intervention;
2. High urban influence, medium human intervention;
3. High urban influence, low human intervention;
4. Low urban influence, high human intervention;

---

[2] ***Degree of urban influence:***

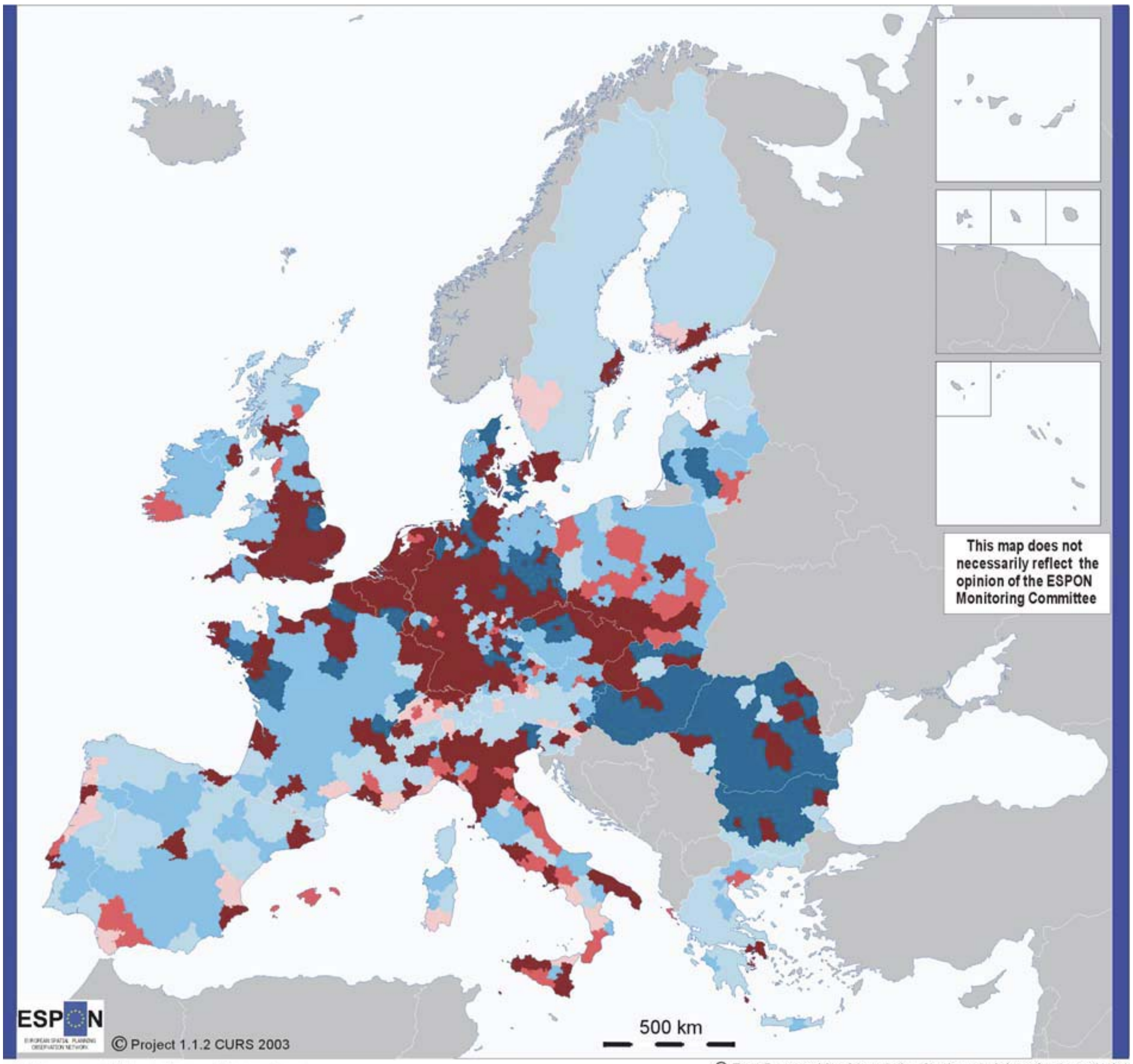
- "*High human intervention* corresponds to a situation where the share of artificial surfaces (and possibly one of the two other land cover categories) is above the European average;
- *Medium human intervention* equals the cases where the share of agricultural land (and possibly the share of residual land cover) is above the European average;
- *Low human intervention* concerns all cases where only the share of residual land cover is above the European average".

[3] ***Degree of human intervention*** was determined by the relative share of land cover according to the main land cover classes of the CORINE data set. The main classes are *artificial surfaces*, *agricultural areas*, and *residual land* cover. The European average of *artificial land* cover is 3.48 percent of the total land cover. The corresponding figure of *agricultural land* is 50.36 and of the *residual group* it is 46.16.

5. Low urban influence, medium human intervention;

6. Low urban influence, low human intervention.

Map. 3 - Urban-Rural Typology



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Urban-rural typology, based on population density, FUA ranking and land cover

- High urban influence, high human intervention
- High urban influence, medium human intervention
- High urban influence, low human intervention
- Low urban influence, high human intervention
- Low urban influence, medium human intervention
- Low urban influence, low human intervention

Ranking of Functional Urban Areas (FUAs):
Origin of data: EUROSTAT, National Statistica Offices, National experts
Source: Nordregio, ESPON Data Base

Population density:
Origin of data: EU15 and CC's: Eurostat
Norway and Switzerland: National Statistical Offices
Time reference:1999

Land cover types:
Origin of data: EEA, Corine Land Cover 90

Source: ESPON Data Base

The criteria for urban influence:
- Population density above the average (107 inhabitants/km^2 in EU25+4)
- And/or at least a European level functional urban area (based on typology made by ESPON Action 1.1.1)

Degree of human intervention is estimated through the average shares of land covers (in EU23+3, no data on Cyprus, Malta and Norway):
High human intervention: at least the share of artificial surfaces above average (3,48%)
Medium human intervention: at least the share of agricultural land above average (50,36%)
Low human intervention: only the share of residual land use above average (46,16%)

Source: Project 1.1.2. – "Urban-Rural Relation in Europe (2002-2004)", Final Report, pp. 29

The case studies should take these six regional categories into consideration, as they portray differentiated facets of organisation and land use and, therefore, contribute towards a response to questions such as how to confirm the importance of small and medium-sized cities in peripheral regions as anchors of regional competitiveness and instruments of spatial cohesion (in their urban-rural relationships), how to characterise the dynamics of competitiveness and cohesion in regions with a sprawling urban population system, or how to assess the importance of connectivity / accessibility in spatial integration at various scales.

Examples of regions in the Typology of urban-rural relations

Typology of urban-rural relations	**Examples of regions**
High urban influence, high human intervention	Benelux countries, a huge part of western Germany, most of England, most of northern Italy and parts of middle and south of Italy strong line of high urban influence and human intervention stretches from the west of Germany through the east to southern Poland, northern Czech Republic down to the west of Slovakia and Hungary. Scattered areas are to be found around the national capitals in particular and some of the seashores of the Mediterranean and the Atlantics. E.g. CATALUNHA, EAST DERBYSHIRE, EAST LOTHIAN AND MIDLOTHIAN, EAST MERSEYSIDE, EAST OF NORTHERN IRELAND, EAST RIDING OF YORKSHIRE, EAST SUSSEX CC, GENOVA, GENT (ARRONDISSEMENT), LEUVEN, MADRID, MILANO, NOORD-DRENTHE, NOORD-FRIESLAND, NOORD-LIMBURG, RHONE, VENEZIA, GRANDE LISBOA
High urban influence, medium human	BALEARES, FERRARA, LUZERNA, MALAGA, PESCARA, ZUIDWEST-FRIESLAND

intervention	
High urban influence, low human intervention	North (Finland and Sweden), the alpine countries (Austria, Switzerland) Portugal and the Mediterranean countries (Spain, France, Italy) E.g. BAIXO MONDEGO, BERCHTESGADENER LAND, BERN, CADIZ, CAGLIARI, VALENCIA
Low urban influence, high human intervention	Lithuania (KAUNO (APSKRITIS)) former GDR, Hungary, Romania, Bulgaria Parts of Denmark and France (BASTOGNE)
Low urban influence, medium human intervention	Part of Portugal, Spain, part of France E.g. ALTO ALENTEJO, ALTO TRAS-OS-MONTES, HAUTE-MARNE, HAUTE-SAONE, HAUTE-VIENNE, PERUGIA, PIACENZA, SEGOVIA
Low urban influence, low human intervention	Finland and Sweden in the north, Ireland in the west and Greece in the southeast E.g. DOURO, GIRONA, HUELVA, EVROS, EVRYTANIA, L'AQUILA, PYRENEES-ORIENTALES, BRATISLAVSKÝ, AALAND

Source: Project 1.1.1. – "The role, specific situation and potentials of urban areas as nodes in a polycentric development" (2002-2004), Final Report

APPENDIX 5.

Main characteristics of the sample regions

a) Results of Principal Component Analysis：

NUTS 3	REGION	Positions	GDP per capita, 2002	Index o f accessibility	Regions OBJ1/2	URBAN_RURAL Typology	Typology of land use, population density and FUA population	City Region	MEGAs classify.
AT13	Wien	4	>125% of EU average	Central	2	High urban influence; High human intervention	Urban densely populated and high urban integration	Vienna	Strong MEGAs
AT221	Graz	1	>125% of EU average	Intermediate	0	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
AT222	Liezen	3	75%-100% of EU average	Peripheral	2	Low urban influence;low human intervention	Peripheral rural, not densely populated and low urban integration		
AT226	Westliche Obersteiermark	3	75%-100% of EU average	Peripheral	2	Low urban influence;low human intervention	Peripheral rural, not densely populated and low urban integration		
AT323	Salzburg und Umgebung	4	>125% of EU average	Intermediate	0	High urban influence; low human intervention	Peripheral urban densely populated and high urban integration		
BE1	Région Bruxelles-capitale/ Brussels hoofdstad gewest	4	>125% of EU average	Very Central	2	High urban influence; High human intervention	Urban densely populated and high urban integration	Brussels	European Engines
BE211	Antwerpen (Arrondissement)	4	>125% of EU average	Central	2	High urban influence; High human intervention	Urban densely populated and high urban integration	Antwerp	Potential MEGAs
BE251	Brugge	4	75%-100% of EU average	Intermediate	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
BE322	Charleroi	1	75%-100% of EU average	Central	0	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
BE342	Bastogne	2	50%-	Intermediate	0	Low urban	Urban-peripheral,		

			75% of EU average			influence; High human intervention	not densely populated but high urban integration		
BE343	Marche-en-Famenne	3	75%-100% of EU average	Intermediate	0	Low urban influence; High human intervention	Urban-peripheral, not densely populated but high urban integration		
CZ01	Praha	4	100%-125% of EU average	Central	2	High urban influence; High human intervention	Urban densely populated and high urban integration	Prague	Potential MEGAs
CZ031	Jihocecký	2	50%-75% of EU average	Peripheral	1	Low urban influence; medium human intervention	Rural-urban, not densely populated, and low urban integration		
CZ032	Plzenský	2	50%-75% of EU average	Intermediate	1	Low urban influence; medium human intervention	Low urban influence, medium human intervention		
CZ041	Karlovarský	2	25%-50% of EU average	Intermediate	1	Low urban influence; High human intervention	Urban-peripheral, not densely populated but high urban integration		
CZ08	Moravskoslezko	2	25%-50% of EU average	Peripheral	1	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
DE111	Stuttgart, Stadtkreis	1	>125% of EU average	Central	0	High urban influence; High human intervention	Urban densely populated and high urban integration	Stuttgart	European Engines
DE129	Pforzheim, Stadtkreis	1	>125% of EU average	Central	0	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
DE21H	München, Landkreis	1	>125% of EU average	Central	0	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Munich	European Engines

NUTS 3	REGION	Posi tions	GDP per capita, 2002	Index o f accessibility	**Regions OBJ1/2**	URBAN_RURAL Typology	Typology of land use, population density and FUA population	City Region	MEGAs classify.
DE229	Regen	3	75%-100% of EU	Intermediate	0	Low urban influence;low human	Rural-urban, not densely populated, and		

			average			intervention	low urban integration		
DE401	Brandenburg an der Havel, Kreisfreie Stadt	2	50%-75% of EU average	Intermediate	1	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
DE501	Bremen, Kreisfreie Stadt	4	>125% of EU average	Central	2	High urban influence; High human intervention	Urban densely populated and high urban integration	Bremen	Potential MEGAs
DE6	Hamburg	4	>125% of EU average	Central	2	High urban influence; High human intervention	Urban densely populated and high urban integration	Hamburg	European Engines
DE712	Frankfurt am Main, Kreisfreie Stadt	1	>125% of EU average	Very Central	0	High urban influence; High human intervention	Urban densely populated and high urban integration	Frankfurt	European Engines
DE803	Rostock, Kreisfreie Stadt	2	75%-100% of EU average	Peripheral	1	High urban influence; High human intervention	Urban densely populated and high urban integration		
DE808	Demmin	2	50%-75% of EU average	Peripheral	1	Low urban influence; medium human intervention	Rural-urban, not densely populated, and low urban integration		
DE80H	Rügen	2	50%-75% of EU average	Peripheral	1	Low urban influence; medium human intervention	Rural-urban, not densely populated, and low urban integration		
DE921	Hannover, Kreisfreie Stadt	4	>125% of EU average	Central	2	Low urban influence; medium human intervention	Urban-rural densely populated and high urban integration		
DE947	Aurich	3	50%-75% of EU average	Peripheral	2	Low urban influence; medium human intervention	Rural-urban, not densely populated, and low urban integration		
DEA11	Düsseldorf, Kreisfreie Stadt	4	>125% of EU average	Very Central	2	High urban influence; High human intervention	Urban densely populated and high urban integration	Dusseldorf	Strong MEGAs
DEA13	Essen, Kreisfreie Stadt	4	>125% of EU average	Very Central	2	High urban influence; High human intervention	Urban densely populated and high urban integration		
DEA23	Köln, Kreisfreie Stadt	1	>125% of EU average	Very Central	0	High urban influence; High human intervention	Urban densely populated and high urban integration	Cologne	Strong MEGAs
DEB25	Trier-Saarburg	1	50%-	Intermediate	0	High urban	Urban-rural		

			75% of EU average			influence; High human intervention	densely populated and high urban integration		
DED31	Leipzig, Kreisfreie Stadt	1	75%-100% of EU average	Central	1	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
DEF09	Pinneberg	4	75%-100% of EU average	Central	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
DK001	København og Frederiksberg Kommuner	1	>125% of EU average	Central	0	High urban influence; High human intervention	Urban densely populated and high urban integration	Copenhagen	European Engines
DK002	Københavns amt	1	>125% of EU average	Central	0	High urban influence; High human intervention	Urban densely populated and high urban integration	Copenhagen	European Engines
DK005	Vestsjællands amt	4	100%-125% of EU average	Peripheral	2	Low urban influence; High human intervention	Urban-rural not densely populated but high urban integration		
DK006	Storstrøms amt	4	75%-100% of EU average	Intermediate	2	Low urban influence; High human intervention	Low urban influence, medium human intervention		
DK00A	Ribe amt	3	100%-125% of EU average	Peripheral	2	Low urban influence; High human intervention	Low urban influence, medium human intervention		
DK00D	Århus amt	4	100%-125% of EU average	Intermediate	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Aarhus	Potential MEGAs

NUTS 3	**REGION**	**Posi tions**	**GDP per capita, 2002**	**Index o f accessibility**	**Regions OBJ1/2**	**URBAN_RURAL Typology**	Typology of land use, population density and FUA population	**City Region**	**MEGAs classif.**
DK00E	Viborg amt	3	100%-125% of EU average	Peripheral	2	Low urban influence; medium human intervention	Low urban influence, medium human intervention		
EE001	Põhja-Eesti	2	50%-75% of EU average	Intermediate	1	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Tallinn	Weak MEGAs
EE008	Lõuna-Eesti	2	25%-50% of	Very Peripheral	1	0	Peripheral rural, not densely		

			EU average				populated and high urban integration		
ES213	Vizcaya	4	75%-100% of EU average	Intermediate	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Bilbao	Potential MEGAs
ES3	Comunidad de Madrid	4	100%-125% of EU average	Intermediate	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Madrid	European Engines
ES415	Salamanca	3	50%-75% of EU average	Very Peripheral	1	Low urban influence;low human intervention	Peripheral rural, not densely populated and high urban integration		
ES418	Valladolid	2	75%-100% of EU average	Peripheral	1	Low urban influence; medium human intervention	Low urban influence, medium human intervention		
ES432	Cáceres	3	50%-75% of EU average	Very Peripheral	1	Low urban influence;low human intervention	Peripheral rural, not densely populated and low urban integration		
ES511	Barcelona	4	75%-100% of EU average	Central	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Barcelona	European Engines
ES523	Valencia	2	75%-100% of EU average	Intermediate	1	High urban influence; low human intervention	Peripheral urban densely populated and high urban integration	Valencia	Potential MEGAs
ES618	Sevilla	2	50%-75% of EU average	Peripheral	1	High urban influence; medium human intervention	Rural-Urban, not densely populated but high urban integration	Sevilla	Weak MEGAs
FI132	Pohjois-Savo	3	75%-100% of EU average	Very Peripheral	1	Low urban influence;low human intervention	Peripheral rural, not densely populated and high urban integration		
FI141	Keski-Suomi	3	75%-100% of EU average	Peripheral	1/2	Low urban influence;low human intervention	Peripheral rural, not densely populated and high urban integration		
FI161	Uusimaa (maakunta)	4	>125% of EU average	Intermediate	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Helsinki	Strong MEGAs
FI171	Varsinais-Suomi	3	100%-125% of EU average	Peripheral	2	High urban influence; low human intervention	Peripheral rural, not densely populated and high urban	Turku	Weak MEGAs

							integration		
FR101	Paris	1	>125% of EU average	Very Central	0	High urban influence; High human intervention	Urban densely populated and high urban integration	Paris	MEGA Global Nodes
FR105	Hauts-de-Seine	4	>125% of EU average	Very Central	2	High urban influence; High human intervention	Urban densely populated and high urban integration		
FR108	Val-d'Oise	4	75%-100% of EU average	Central	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
FR232	Seine-Maritime	4	100%-125% of EU average	Intermediate	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Le Havre	Weak MEGAs
FR301	Nord	4	75%-100% of EU average	Intermediate	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Lille	Potential MEGAs
FR612	Gironde	4	100%-125% of EU average	Intermediate	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Bordeaux	Weak MEGAs
NUTS 3	**REGION**	**Posi tions**	**GDP per capita, 2002**	**Index o f accessibility**	**Regions OBJ1/2**	**URBAN_RURAL Typology**	Typology of land use, population density and FUA population	**City Region**	**MEGAs classif.**
FR623	Haute-Garonne	4	100%-125% of EU average	Intermediate	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Toulouse	Potential MEGAs
R715	Loire	4	75%-100% of EU average	Intermediate	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
FR716	Rhône	4	100%-125% of EU average	Central	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Lyon	Potential MEGAs
FR723	Haute-Loire	3	50%-75% of EU average	Peripheral	2	Low urban influence; medium human intervention	Rural-urban, not densely populated, and low urban integration		
FR815	Pyrénées-Orientales	3	50%-75% of EU average	Intermediate	2	Low urban influence;low human intervention	Peripheral rural, not densely populated and high urban integration		
FR823	Alpes-Maritimes	4	75%-	Central	2	High urban	Urban-rural	Nice	Potential

			100% of EU average			influence; High human intervention	densely populated and high urban integration		MEGAs
FR824	Bouches-du-Rhône	4	75%-100% of EU average	Intermediate	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Marseille	Potential MEGAs
GR115	Kavala	3	50%-75% of EU average	Peripheral	1	Low urban influence;low human intervention	Peripheral rural, not densely populated and low urban integration		
GR122	Thessaloniki	2	75%-100% of EU average	Intermediate	1	High urban influence; medium human intervention	Rural-Urban, not densely populated but high urban integration		
GR144	Trikala	3	50%-75% of EU average	Very Peripheral	1	Low urban influence;low human intervention	Peripheral rural, not densely populated and low urban integration		
GR3	Attiki	2	75%-100% of EU average	Intermediate	1	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Athens	Strong MEGAs
HU011	Budapest	1	75%-100% of EU average	Central	1	High urban influence; High human intervention	Urban densely populated and high urban integration	Budapest	Potential MEGAs
HU012	Pest	2	25%-50% of EU average	Central	1	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
HU031	Gyor-Moson-Sopron	2	50%-75% of EU average	Intermediate	1	Low urban influence; High human intervention	Urban-rural not densely populated but high urban integration		
HU072	Békés	2	25%-50% of EU average	Peripheral	1	Low urban influence; High human intervention	Urban-rural not densely populated but high urban integration		
HU073	Csongrád	2	25%-50% of EU average	Peripheral	1	Low urban influence; High human intervention	Urban-rural not densely populated but high urban integration		
IE012	Midlands	2	75%-100% of EU average	Peripheral	1	Low urban influence; medium human intervention	Rural-urban, not densely populated, and low urban integration		
IE021	Dublin	1	>125% of EU average	Intermediate	0	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Dublin	Strong MEGAs
IE023	Midwest	3	100%-125% of	Peripheral	0	Low urban influence; medium	Rural-urban, not densely		

			EU average			human intervention	populated, and low urban integration		
IE025	South-West (IE)	4	>125% of EU average	Intermediate	0	High urban influence; medium human intervention	Rural-urban, not densely populated, and low urban integration	Cork	Weak MEGAs

NUTS 3	REGION	Positions	GDP per capita, 2002	Index o f accessibility	Regions OBJ1/2	URBAN_RURAL Typology	Typology of land use, population density and FUA population	City Region	MEGAs classif.
IT111	Torino	4	>125% of EU average	Central	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Turin	Potential MEGAs
IT133	Genova	4	100%-125% of EU average	Central	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Genova	Weak MEGAs
IT134	La Spezia	4	100%-125% of EU average	Intermediate	2	High urban influence; low human intervention	Peripheral urban densely populated and high urban integration		
IT205	Milano	4	>125% of EU average	Very Central	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Milan	European Engines
IT311	Bolzano-Bozen	3	>125% of EU average	Peripheral	2	Low urban influence;low human intervention	Peripheral rural, not densely populated and high urban integration		
IT326	Padova	4	100%-125% of EU average	Intermediate	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
IT405	Bologna	4	>125% of EU average	Central	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Bologna	Potential MEGAs
IT603	Roma	4	>125% of EU average	Central	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Roma	European Engines
IT803	Napoli	1	50%-75% of EU average	Central	1	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Naples	Weak MEGAs
IT935	Reggio di	2	50%-	Intermediate	1	High urban	Rural-Urban, not		

	Calabria		75% of EU average			influence; medium human intervention	densely populated but high urban integration		
LT003	Klaipedos (Apskritis)	2	25%-50% of EU average	Very Peripheral	1	Low urban influence; High human intervention	Urban-peripheral, not densely populated but high urban integration		
LT004	Marijampoles (Apskritis)	2	<25% of EU average	Peripheral	1	Low urban influence; medium human intervention	Rural-urban, not densely populated, and low urban integration		
LT00A	Vilniaus (Apskritis)	2	25%-50% of EU average	Intermediate	1	High urban influence; medium human intervention	Peripheral rural, not densely populated and high urban integration	Vilnius	Weak MEGAs
LU	Luxembourg	4	>125% of EU average	Central	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Luxemburg	Potential MEGAs
LV001	Riga	2	50%-75% of EU average	Intermediate	1	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Riga	Weak MEGAs
LV002	Vidzeme	2	<25% of EU average	Peripheral	1	Low urban influence;low human intervention	Peripheral rural, not densely populated and low urban integration		
LV003	Kurzeme	3	25%-50% of EU average	Very Peripheral	1	Low urban influence;low human intervention	Peripheral rural, not densely populated and high urban integration		
NL111	Oost-Groningen	4	50%-75% of EU average	Peripheral	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
NL121	Noord-Friesland	4	100%-125% of EU average	Intermediate	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
NL324	Agglomeratie Haarlem	1	75%-100% of EU average	Very Central	0	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
NL326	Groot-Amsterdam	4	>125% of EU average	Very Central	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Amsterdam	European Engines
NL333	Delft en Westland	1	>125% of EU average	Central	0	High urban influence; High human	Urban-rural densely populated and high urban		

						intervention	integration		

NUTS 3	REGION	Posi tions	GDP per capita, 2002	Index o f accessibility	Regions OBJ1/2	URBAN_RURAL Typology	Typology of land use, population density and FUA population	City Region	MEGAs classif.
NL335	Groot-Rijnmond	4	100%-125% of EU average	Central	2	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Rotterdam	Potential MEGAs
PL014	M. Wroclaw	2	50%-75% of EU average	Intermediate	1	High urban influence; High human intervention	Urban densely populated and high urban integration	Wroklaw	Weak MEGAs
PL033	Lubelski	2	25%-50% of EU average	Peripheral	1	High urban influence; medium human intervention	Rural-Urban, not densely populated but high urban integration		
PL053	Miasta Lódz	2	50%-75% of EU average	Peripheral	1	High urban influence; High human intervention	Urban densely populated and high urban integration	Lodz	Weak MEGAs
PL063	Miasta Kraków	2	50%-75% of EU average	Intermediate	1	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Krakow	Weak MEGAs
PL075	Miasta Warszawa	1	100%-125% of EU average	Central	1	High urban influence; High human intervention	Urban densely populated and high urban integration	Warsaw	Potential MEGAs
PL0B3	Gdansk-Gdynia-Sopot	2	50%-75% of EU average	Intermediate	1	High urban influence; High human intervention	Urban densely populated and high urban integration	Gdanks	Weak MEGAs
PL0C3	Centralny slaski	2	50%-75% of EU average	Intermediate	1	High urban influence; High human intervention	Urban densely populated and high urban integration	Katowice	Weak MEGAs
PL0E1	Elblaski	2	25%-50% of EU average	Peripheral	1	Low urban influence; medium human intervention	Rural-urban, not densely populated, and low urban integration		
PL0E3	Elcki	2	<25% of EU average	Very Peripheral	1	Low urban influence; medium human intervention	Rural-urban, not densely populated, and low urban integration		
PL0F5	Miasta Poznan	1	75%-100% of	Intermediate	1	High urban influence; High	Urban densely populated and	Poznan	Weak MEGAs

			EU average			human intervention	high urban integration		
PL0G1	Szczecinski	2	25%-50% of EU average	Peripheral	1	High urban influence; medium human intervention	Rural-urban, not densely populated, and low urban integration	Szczecin	Weak MEGAs
PT114	Grande Porto	1	75%-100% of EU average	Intermediate	1	High urban influence; High human intervention	Urban densely populated and high urban integration	Oporto	Weak MEGAs
PT129	Beira Interior Sul	3	50%-75% of EU average	Very Peripheral	1	Low urban influence;low human intervention	Peripheral rural, not densely populated and low urban integration		
PT132	Grande Lisbon	4	>125% of EU average	Intermediate	0	High urban influence; High human intervention	Rural-Urban, not densely populated but high urban integration	Lisbon	Potential MEGAs
PT133	Península de Setúbal	2	50%-75% of EU average	Peripheral	0	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Lisbon	Potential MEGAs
PT15	Algarve	2	50%-75% of EU average	Peripheral	1	Low urban influence;low human intervention	Rural-urban, not densely populated, and low urban integration		
SI001	Pomurska	2	50%-75% of EU average	Peripheral	1	Low urban influence; High human intervention	Urban-peripheral, not densely populated but high urban integration		
SI005	Zasavska	2	50%-75% of EU average	Intermediate	1	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
SI00B	Goriska	2	50%-75% of EU average	Intermediate	1	Low urban influence;low human intervention	Peripheral rural, not densely populated and high urban integration		
SI00E	Osrednjeslovenska	2	75%-100% of EU average	Intermediate	1	High urban influence; High human intervention	Urban-rural densely populated and high urban integration	Ljubljana	Weak MEGAs

NUTS 3	**REGION**	**Positions**	**GDP per capita, 2002**	**Index o f accessibility**	**Regions OBJ1/2**	**URBAN_RURAL Typology**	**Typology of land use, population density and FUA**	**City Region**	**MEGAs classi.**

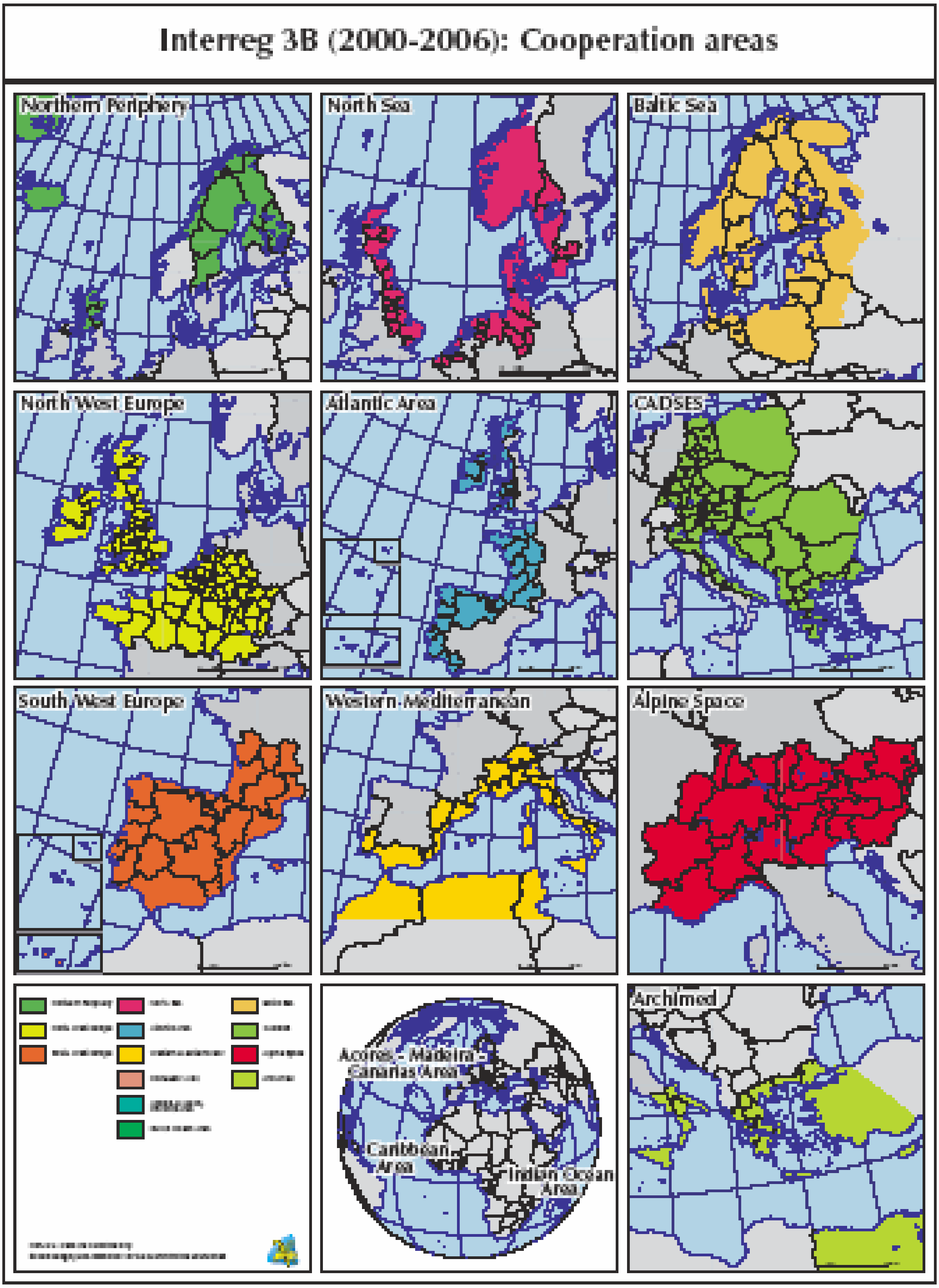
							population		
SK01	Bratislavský	4	75%-100% of EU average	Central	2	High urban influence; High human intervention	Urban densely populated and high urban integration	Bratislava	Potential MEGAs
SK021	Trnavský kraj	2	50%-75% of EU average	Intermediate	1	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
SK022	Trencianský kraj	2	25%-50% of EU average	Peripheral	1	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
UKD12	East Cumbria	3	75%-100% of EU average	Peripheral	2	Low urban influence; medium human intervention	Rural-urban, not densely populated, and low urban integration		
UKD31	Greater Manchester South	4	100%-125% EU average	Central	2	High urban influence; High human intervention	Urban densely populated and high urban integration	Manchester	Strong MEGAs
UKD32	Greater Manchester North	4	50%-75% of EU average	Central	2	High urban influence; High human intervention	Urban densely populated and high urban integration	Manchester	Strong MEGAs
UKE22	North Yorkshire CC	3	75%-100% EU average	Intermediate	2	Low urban influence; medium human intervention	Rural-urban, not densely populated, and low urban integration		
UKE32	Sheffield	2	75%-100% of EU average	Intermediate	1	High urban influence; High human intervention	Urban-rural densely populated and high urban integration		
UKF21	Leicester City	4	100%-125% of EU average	Intermediate	2	High urban influence; High human intervention	Urban densely populated and high urban integration		
UKG31	Birmingham	4	75%-100% of EU average	Central	2	High urban influence; High human intervention	Urban densely populated and high urban integration	Birmingham	Potential MEGAs
UKI11	Inner London - West	4	>125% of EU average	Very Central	2	High urban influence; High human intervention	Urban densely populated and high urban integration	London	MEGA Global Nodes
UKI12	Inner London - East	4	100%-125% of EU average	Central	2	High urban influence; High human intervention	Urban densely populated and high urban integration	London	MEGA Global Nodes
UKI21	Outer London - East and North	4	50%-75% of	Central	2	High urban influence; High	Urban densely populated and	London	MEGA Global

	East		EU average			human intervention	high urban integration		Nodes
UKI22	Outer London - South	1	75%-100% EU average	Central	0	High urban influence; High human intervention	Urban densely populated and high urban integration	London	MEGA Global Nodes
UKI23	Outer London - West and North West	4	100%-125% of EU average	Very Central	2	High urban influence; High human intervention	Urban densely populated and high urban integration	London	MEGA Global Nodes
UKJ32	Southampton	1	100%-25% EU average	Intermediate	0	High urban influence; High human intervention	Urban densely populated and high urban integration	Southampton	Weak MEGAs

b) Results of the complementary method:

NUTS 3	**REGION**	**City Region**	**MEGAs**	**NUTS 3**	**REGION**	**City Region**	**MEGAs**
UKM25	Edinburgh	Edinburgh	Potential MEGAs	**DE302**	**Berlin-Ost, Stadt**	Berlin	European Engines
UKM34	Glasgow	Glasgow	Potential MEGAs	**NO011**	**Oslo**	Oslo	Strong MEGAs
RO054	Timis	Timisoara	Weak MEGAs	**NO022**	**Oppland**		
RO081	Bucuresti	Bucarest	Weak MEGAs	**NO051**	**Hordaland**	Bergen	Potential MEGAs
SE011	Stockholm län	Stockholm	Strong MEGAs	**NO073**	**Finnmark**		
SE021	Uppsala län			**BG041**		Sofia	Weak MEGAs
SE044	Skåne län	Malmo	Potential MEGAs	**CH021**		Bern	Potential MEGAs
SE0A2	Västra Götalands län	Gothemburg	Strong MEGAs	CH04		Zurich	European Engines
DE301	Berlin-West, Stadt	Berlin	European Engines	MT001	Malta	Valetta	Weak MEGAs
				MT002	Gozo /Comino		

APPENDIX 6.


Interreg 3B (2000-2006): Cooperation areas
Northern Periphery
North Sea
Baltic Sea
North West Europe
Atlantic Area
CADSES
South West Europe
Western Mediterranean
Alpine Space
Açores - Madeira - Canarias Area
Caribbean Area
Indian Ocean Area
Archimed