



On behalf of the European Commission, DG Regional Policy
(2005 CE 16 0 AT 017)

Study on "territorial cohesion, lessons learned from the ESPON
programme projects and strategy for the future

Appendix D – Case Study on Exploiting potential ESPON complementarities with other Community programmes

By Carlo Sessa – ISIS

June 2006

Table of Contents

0. Introduction	3
1. Overview of ESPON complementarities with other EU programmes	4
2. What ESPON has to offer ?	7
Concepts of territorial cohesion and polycentric development	7
ESPON data base and core indicators	8
GIS orientated instruments	9
Regional Classification of Europe	10
Spatial analysis tools	11
Territorial Impact Analysis	13
Macroeconomic, Sectoral, Social and Territorial Model (MASST)	14
Know Trans-European Networks (KTEN)	16
European Territorial Cohesion Index (ETCI)	17
Long-Term Database (LTDB)	17
Data availability problems and the ESPON Data Navigator	19
3. How to overcome data shortages: exploit the linkages with INSPIRE, GEOSS and GMES	21
What is the INSPIRE initiative	21
Environmental user needs	22
The INSPIRE implementation process	26
The GEOSS and GMES initiatives	29
Potential complementarities of ESPON with INSPIRE and GEOSS/GMES	30
4. Potential linkages of ESPON with other EU Research activities for EU policy impact assessment	33
Monitoring the EU Sustainable Development Strategy	33
Impact assessment of EU policies and the EU Research to develop SIA and SEA methods.	35
Potential complementarities of ESPON with EU research on sustainable development monitoring and impact assessment	40
5. How to exploit ESPON at the regional scale: potential linkages with INTERACT/INTERREG programme	43
About INTERREG and INTERACT	43
Potential complementarities of ESPON with INTERACT/ INTERREG	44
6. How to exploit ESPON at the urban scale: potential linkages with the Urban Audit and the URBACT programme	47
The EU urban policy and programmes	47
Urban data needs	49
Potential complementarities of ESPON with other EU urban programmes	51

0. Introduction

The aim of the ESPON strategy case study is to identify potential complementarities of the ESPON programme with other programmes and policies at EU level, which may be useful to exploit to enhance the effectiveness and impact of the programme in the future.

The study is articulated in six sections as follows:

1. **Overview** of ESPON actual and potential complementarities with other Community programmes and policies.
2. **What ESPON has to offer ?** This is a review of the main products of the ESPON cross-thematic projects which represent durable results and for which specific complementarities with other EU programmes can be identified
3. **How to overcome data shortages** thanks to the INSPIRE initiative and the exploitation of the earth observation programmes GEOSS and GMES, by strengthening the interaction of ESPON with these data infrastructure programmes.
4. **Support to the EU Sustainable Development Strategy and EU sectoral policies.** This is a review of the potential support ESPON can provide to the EU Sustainable Development strategy and the implementation of Sustainable Development Indicators at national and regional level by one side, and to the spatial impact assessment of EU sectoral policies on another side. Impact assessment activities need to be coordinated with the EU Research Framework projects currently developing impact assessment methodologies and tools (e.g. Sustainability Impact Assessment, Strategic Environmental Assessment).
5. **How to exploit the ESPON results and tools at the regional scale**, in particular strengthening the linkages with the INTERACT/INTERREG programme.
6. **How to exploit the ESPON results and tools at the urban scale**, in particular strengthening the linkages with URBACT - and the future Framework programme for the exchange of experience on urban renewal - to disseminate ESPON data, tools and results to end users (city policy makers), as well as the linkages with the Urban Audit initiative to foster and expand city benchmarking activities at EU level.

1. Overview of ESPON complementarities with other EU programmes

The present study focuses on the potential complementarities of the ESPON programme with other EU programmes and policies which are or could be related in the near future to ESPON because they:

- can provide important spatial data inputs for ESPON activities (INSPIRE, GEOSS, GMES);
- will develop methodologies and tools for impact assessment (SIA – Sustainability Impact Assessment; SEA – Strategic Environmental Assessment) which are strongly related (and partially overlapping) with the territorial impact assessment methods developed in ESPON (EU Environmental Research);
- can help to disseminate and share the knowledge of ESPON results with end users beyond the scientific community – policy makers, practitioners – at regional and urban level (INTERACT, URBACT). In the context of these programmes the ESPON methods and tools could be also applied to deliver territorial assessments of the thematic co-operation programme activities focusing on Lisbon and Gothenburg priorities;
- are sectoral policies whose spatial impact would be better understood if the new ESPON methodologies and tools are consistently applied. These sectoral policies are to be framed also in the context of the overarching EU Sustainable Development Strategy, and ESPON could provide a specific support in the development and maintenance of Sustainable Development Indicators (SDI) to monitor the implementation of this strategy.

The complex system of complementarities and potential interactions between ESPON and the mentioned programmes and policies is illustrated in the diagram below.

In the following sections we will describe the single components of the diagram and discuss the potential linkages with ESPON. In order to identify as far as specific complementarities, in section 2 the main methodologies and tools delivered so far by ESPON are also described.

Overview of ESPON complementarities with other EU programmes

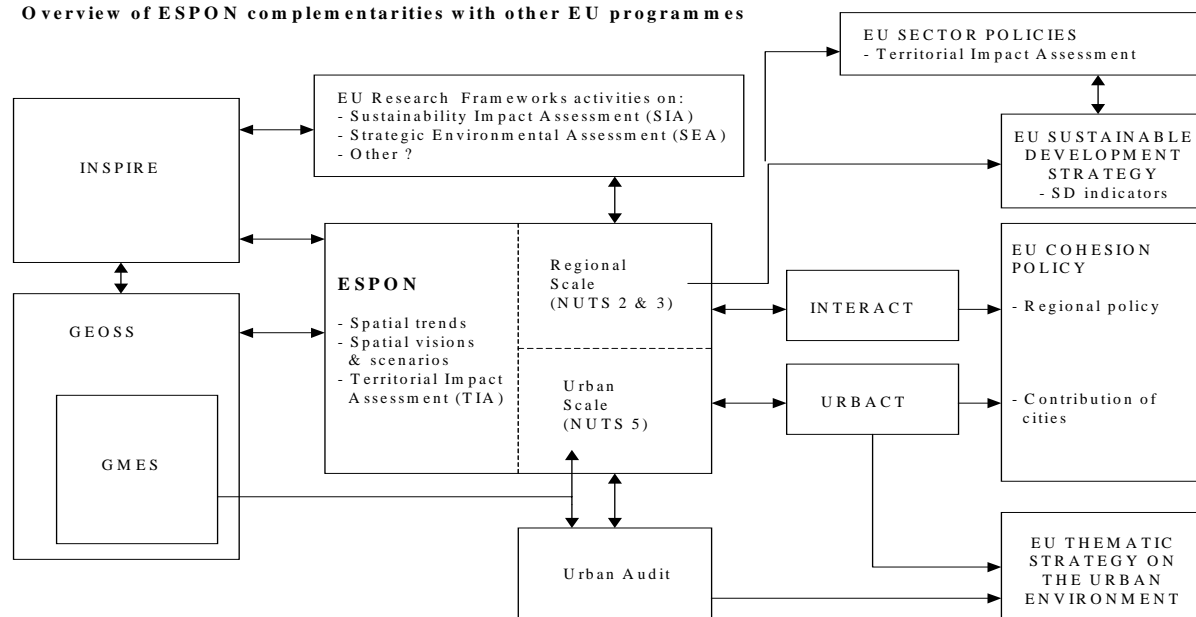


Table 1 below give an overview of the potential interactions of the ESPON products with the other EU programmes. More detailed statements about some of these interactions are included in the tables at the end of chapter 3 and 4.

ESPON Products:	Potential complementarities of ESPON products with:								
	Data Infrastructure Programmes			Research Framework Projects			Territorial Cooperation Programmes		
	INSPIRE	GEOSS	GMES	SIA	SEA	Other ¹	INTERACT/ INTERREG	URBACT	URBAN AUDIT
Territorial cohesion / polycentrism				X	X		X		
ESPON database/ core indicators	X					X			X
GIS orientated instruments	X						X		
Regional Classification of Europe							X		
Spatial Analysis Tools	X						X		
Territorial Impact Analysis				X	X				
MASST				X					
KTEN					X	X			
ETCI				X		X	X		

¹ This column has been included to add any other EU Research activity that will be deemed relevant to connect to ESPON, besides those already identified in this first draft of the case study (see section 4).

Long-Term database	X								
Data Navigator	X								

Table 1: Potential complementarities of ESPON products with other EU programmes

2. What ESPON has to offer?

Before discussing the potential linkages with other programmes, the obvious starting is to consider what ESPON has to offer in terms of methodologies, data and tools which can be delivered or used for the sake of other programmes implementation or policy evaluation.

Briefly, the ESPON applied research so far was focused on three mainstreams:

- Trend analysis for several aspects, including urban system and polycentric development, urban-rural relations, small and medium size cities, accessibility and transport networks, telecommunication, demography, enlargement, natural and technological hazards, natural heritage, governance, cultural heritage, information society.
- Territorial impact analysis of several policies, including structural funds, pre-accession aid, EU infrastructure policy, EU R&D policy, EU Agricultural policy, EU energy policy, EU fisheries policy, structural funds in urban areas.
- Cross-thematic projects, focusing so far mainly on integrated tools for spatial development, spatial scenarios and orientations and the realisation of the Lisbon process.

The focus here is not on the results of these mainstreams activities, which are illustrated in the ESPON project reports and the synthesis elaborated by the ESPON Secretariat (cfr ...), but on the main problems encountered, and the potentialities to overcome at least some of them in the future ESPON activities, in particular by establishing effective linkages with other EU programmes.

However, before discussing in the next chapters why and how to develop fruitful linkages with other EU programmes, we need to illustrate briefly in the next sections of this chapter what are the main results and tools provided by ESPON ².

Concepts of territorial cohesion and polycentric development

ESPON studies have contributed to better define the concepts of “territorial cohesion” and “polycentric development”.

Territorial cohesion, meaning the balanced development of human activities across the European Union, is complementary to economic and social cohesion. The concept encompasses the objective to lessen the disparities between regions, whatever their nature. Nevertheless, it cannot be limited to this to the extent that the word “territorial” carries additional meaning. An important additional meaning relates to the accessibility of citizens to any essential services and basic facilities, wherever they live in the European Union. Thus territorial cohesion translates the goal of sustainable development in spatial terms, and may be identified with the **fair access for citizens and economic operators to services of general economic interest (SGEI)**, irrespective of the territory to which they belong.

The concept of **polycentric spatial development** merges the two policy aims encompassed in the European Spatial Development Perspective, i.e. “economic growth” and “balanced

² the description is based on ESPON project 3.1 and 3.2 reports

development". A polycentric situation occurs when two or more cities have functions that complement each other and have links with each other. Prerequisites for polycentric development are: functions (often but not always depending on size), flows (often but not always depending on proximity) and co-operation (depending on mutual understanding, strategic interest and dependencies). Furthermore, polycentric development stems from two main processes: i) structural (economic, functional, resulting from spontaneous spatial development, and ii) institutional (political), based on voluntary co-operation.

In practice polycentric spatial development refers to at least three spatial levels:

- **Regional/local level:** the aim is to move from one or few dominating regional centres to several centres providing regional services. Key aspects are economic integration and specialisation. This may also involve strategic alliances between cities in areas where critical mass is problematic.
- **Trans-national/national level:** the aim is to go from dominating major cities to a more balanced tissue of cities, improving economic performance and services through clusters of neighbouring cities, showing a sufficient specialisation within the national urban system.
- **Global/European level:** the aim is to support a more balanced territorial structure at the European level by encouraging the development of functional urban areas (or clusters of cities) of global importance outside the "pentagon", which is currently seen as the only important global zone within the enlarged EU. This can be achieved by strategic alliances between functional urban areas and by strengthening the international competitiveness of a functional urban area. In both cases the focus is on the strengthening of the global position by unleashing the endogenous potentials of European or global importance. These potential can be of various nature, such as economic specialisation or cultural international-peak competence.

Several ESPON studies focused on how to enable a greater territorial cohesion through a polycentric spatial development of the European territory. However, these studies revealed that availability of data about functions and in particular about spatial relations between centres are very weak (see chapter 3 below)

ESPON data base and core indicators

The ESPON data base includes core data, indicators and typologies that provide a common backbone to the ESPON projects. The current version of the data base has an ACCESS format and it is easy to be handled and integrated with new data provided by the on-going ESPON projects.

The ESPON data base is divided into the area raw data (e.g. Eurostat data) and the area of indicators computed by the different ESPON projects. The selection of indicators is organised in a narrowing process, with a first selection criteria based on main themes (e.g. population, employment and labour market, etc.), then a further selection based on sub-themes. At the end of the day, the user can select up to 25 variables or indicators out of maximal 3 different tables, creating a new ACCESS table that can be exported into EXCEL.

An overview of the ESPON data base shows a number of tables of data mostly at NUTS2 level (but a few are at NUTS3), covering different topics: spatial typologies, population, employment and labour market, wealth and production, transport, R&D, ICT, education, land use, environment, agriculture, social situation, tourism, public sector, ESPON Regional Classification of Europe (see below). The geographical coverage is EU25 + Switzerland, Norway, Romania and Bulgaria.

From the data available in the ESPON database it was possible to define a list of core indicators. By now, 103 core indicators have been identified, several of which can be only implemented on the NUTS2 level due to the lack of more detailed data. However, the majority of core indicators are available at the NUTS3 level, which was the target level of territorial data to be included in the database. But it is important to note that to build time series from these data is often problematic, because adjustments or even delimitation of the NUTS zones have always caused gaps in information, only sometime filled with backward related recalculation.

In the field of urban topics, more elaborated data sets are necessary in future which will allow a more comprehensive analysis of urban areas as nodes in a polycentric development. For this socio-economic data and coherent time series at municipal scale (NUTS5) are needed, as well as data on flows between urban areas.

GIS orientated instruments

The **ESPON map kit** has been elaborated as an ESRI ArcView3.2 application. It enables the construction of maps covering the EU25+2+2 territory on different regional levels (NUTS0, NUTS1, NUTS2, NUTS3 and NUTS2&3). The surrounding countries (non ESPON space) have been also added, including map background and borders and coastlines.

Thus, the ESPON projects all benefited from the availability of a common tool to produce regionally based thematic maps. In addition to the geographical data on the ESPON regions (NUT1 to NUTS3) each ESPON project has been equipped with vector data of the municipalities of the ESPON countries, which could be mapped and used for analytical purposes.

Another important instrument is the ESPON Web GIS portal, which allows the analysis of ESPON geographical and statistical data through the Internet for the general public, although the access is restricted by a password. This portal provides three options:

- **Simple Analysis Map**, an interactive application which allow the user to access and visualise predefined maps of currently available data and indicators.
- **Advanced Analysis Map**, a more advanced application that allow the user to develop new dynamic maps from the available ones, modifying key representational features or adding new data.
- **Statistical Analysis**, an interactive application that allow the user to make a statistical analysis of any variable or indicator available in the data base, producing standard statistics (e.g. mean, max, min, standard deviation, coefficient of variation).

It is important to mention that in all these Internet tools data are organised according to the ESPON Data Navigator guidelines, i.e. divided in 19 thematic categories and 64 subcategories of data and structured NUTS0, NUTS1, NUTS2 and NUTS3 geographical levels.

Regional Classification of Europe

The ESPON programme has produced a broad range of specific new knowledge in different thematic fields, using single indicators to represent the geographical distribution and trends of specific phenomena.

In particular, 8 thematic fields have been analysed using 37 indicators. The thematic fields of analysis are:

1. **Regionalised Lisbon performance**, using 5 indicators of knowledge society performance according to the Lisbon goals.
2. **Economically successful regions**, based on 2 economic indicators (level and change of regional GDP).
3. **Efficiency of labour markets**, using 7 employment indicators.
4. **Accessibility**, using 5 indicators of potential accessibility of the regions by different transport modes.
5. **Change of population**, based on 4 indicators of population density, structure and growth.
6. **Naturalness**, using 3 indicators of artificial, natural and agricultural surface
7. **Hazards exposure**, using 7 indicators of natural and man made hazards.
8. **Spatial concentration**, using 4 indicators of spatial settlement.

The indicators of each thematic field have been combined into a unique synthetic indicator, with a simple technique named "Regional Classification of Europe". To keep the method as simple and transparent as possible, the indicators were combined by simply adding the standardised values of the single indicators and using equal weights for each indicators. Then the values of the synthesis indicator were divided in 5 classes in order to represent the indicator on the NUTS2 level maps.³

The analysis was done at NUTS2 level because at the more detailed NUTS3 level the number of useful indicators, due to data limitations, would have been reduced to five to ten indicators at most.

³ As explained in a footnote at page 22 of the ESPON Midterm results by spring 2005 "the classes used in the maps have been calculated on the basis of mean value and standard deviation:

- Highly below average: from minimum up to mean value $-1,16$ standard deviation
- Below average: from mean value $-1,16$ standard deviation up to mean value $-1/2$ standard deviation
- Average: mean value $+/- 1/2$ standard deviation
- Above average: from mean value $+1/2$ standard deviation to mean value $+1,16$ standard deviation
- Highly above average: from mean value $+1,16$ standard deviation to maximum."

Spatial analysis tools

The aim of the spatial analysis tools developed by ESPON was to define methods to measure objectively the rather fuzzy concepts that are involved in the ESDP. In the following table the main spatial analysis tools are listed together with the main policy purpose they may fit in:

Spatial Analysis Tool	Policy purpose
<i>Multiscalar Territorial Analysis (MTA)</i> : the tool allows to compute the relative deviation of a region from the European, national and local average and it can help to find out potential contradictions at different levels of action	<i>Subsidiarity & Legitimacy of Regional Policy</i> : according to this principle, the Regional policy should not duplicate the action of the Member States and should avoid contradictions between levels of intervention (European, national, regional)
<i>Homogeneity and Discontinuity Analysis (HAD)</i> : these tools are dedicated to the analysis and measurement of spatial heterogeneity, which is not the case of classical econometric indexes	<i>Territorial cohesion & Integration of Sectoral Policies</i> : the originality of this new concept lies in taking into account the spatial dimension of the sectoral policies developed by EU
<i>Modifiable Area Unit Problem (MAUP)</i> : the effect of changing territorial divisions on statistical and cartographic results is well known. But the best division from the scientific point of view can be politically not correct (NUTS 2-3)	<i>Gerrymandering and manipulation of territorial divisions</i> : the allocation of Structural Funds is related to official NUTS divisions which can be intentionally manipulated by states in order to maximise their benefits
<i>Multiscalar Smoothing Methods (MSM)</i> : these methods make possible to derive multivariate maps of potential economic and demographic flows induced by the unequal repartition of population and wealth	<i>Polycentrism & Accessibility</i> : the connection of a territory to the rest of Europe or to the rest of the World should be organised around nodes or networks which can be defined at different scales

(Source ESPON project 3.1 report)

Multiscalar Territorial Analysis (MTA) is based on the assumption that it is not possible to evaluate the situation of a given territorial unit without taking into account values for neighbouring units and for the higher level (regional or national) entities it belongs to. Indeed, for policy analysis purposes contrast and gradients are of much more interest than absolute values. Taking the indicator “GDP per capita” as an example, MTA implies a three-level analysis of deviations of a given region value from the global level average (EU15 or EU27), the national average or the local average of neighbouring regions. The latter deviation is particularly interesting, taking the geographical contiguous regions as a reference area in most of the cases. However, it is possible to use also more flexible criteria to identify the “neighbourhoods” of a given region, based on variables measuring the level of interaction (e.g. commuting flows) between the regions.

Homogeneity and Discontinuity Analysis (HAD) produces maps of discontinuities describing the contrasts between contiguous territorial entities. They can be defined in absolute and relative terms, according to the assumptions of the observer or the problem to be analysed. Substantial differences between contiguous regions create distortions which are generally considered detrimental for territorial cohesion (“territorial gaps”). But those

discontinuities can also reveal opportunities of cooperation and exchange in a framework of local partnership for development. The database necessary for the analysis of discontinuities includes GIS files describing the geometry of regional boundaries at NUTS2 level and general attributes of these boundaries: approximated length, political meaning (external border of the EU, internal border etc.), presence/absence of a common language, level of potential interaction (e.g. product of the populations of the two regions in contact), etc. Indeed, the analysis of "discontinuities" is multivariate, i.e. it relates always to a multiplicity of criteria measured by various attributes. In some cases an interesting analysis can be done with reference to only one indicator, as the variation or "gradient" of GDP per capita between two contiguous regions (these kind of analysis are key for fiscal equalisation purposes). The analysis of an interregional gradient can be done not only for absolute values but also for relative ones. However, the definition of territorial discontinuities are better done on the base of more than one parameter. For instance the evaluation of the potential flows between neighbouring regions depends also from the amount of population located on each side, from the presence of a common language, from the demographic complementarities, etc..

The **Modifiable Area Unit Problem (MAUP)** has been recognised since the 1970's as one of the most difficult challenge for geographers, cartographers and spatial analysts. Actually the level of correlation between two variables distributed in space can be completely modified according to the level of aggregation of spatial units or more generally the spatial grid used to collect the spatial information (ecological correlation). The most evident drawback is the fact that the amount of population or administrative units which fulfil the condition of eligibility for territorial cooperation policies is completely modified according to the NUTS level of administrative divisions (communes, provinces, regions) taken into account. Apparently, the use of a mixture of NUTS2 and NUTS3 levels is a good compromise between precision of results and elimination of the biases related to the separation of urban, periurban and rural areas. But some problems remain in the case of isolated metropolitan areas at upper scale of territorial division (like Hamburg, Bremen or Brussels-Capital which are NUTS1 units). Policy makers could agree to the choice of different NUTS level according to the different states (e.g. maps combining NUTS2 in Germany and NUTS3 in France) but they would certainly not easily agree to the modification of official NUTS level inside a given state (e.g. aggregation of Brussels with the two regions of North and South Brabant).

Multiscalar Smoothing Methods (MSM) fully eliminate the problem of the initial territorial division and produce smoothed distribution of the target phenomena. For example the Gaussian smoothing method developed by the Hypercarte Project has been applied to the distribution of population and GDP in 1999 in order to produce a map of GDP per capita in neighbourhoods of 50 kilometres, independent from the original territorial divisions. Indeed, a very important property of the smoothing method is the fact that it makes possible the comparison of maps derived from different initial territorial divisions (Corine Landcover grid and a NUTS5 division) and the combination of indexes derived from heterogeneous sources. Furthermore, the smoothing method can help to solve the major challenge of realisation of harmonised series of maps at different point of time, whatever the dramatic changes can occur in basic territorial units. In the of data at NUTS3 level the optimal smoothed map can be obtained around a span of 50 km. But is also possible to consider the variation of the spatial distribution according to scale as a major tool for the exploration of social consequences of spatial heterogeneities. We can propose an equivalent model for the situation of a place according to neighbourhoods of 50, 100, 200 or 400 kilometres: and

island of prosperity surrounded by poor regions will have a decreasing level of GDP per capita when the scale of neighbourhood increase. On the contrary, some poor areas near richer regions will have increasing level of GDP per capita when the span of neighbourhood increases.

Thanks to their properties, maps produced with multiscalar smoothing methods can be used:

- To define the potential economic and demographic effects of inequalities in the distribution of population and wealth in the European territory, although the methods should be used very carefully because many parameters depend on external expert knowledge on the behaviour of workers and economic actors.
- To continue with further research on the key question of polycentrism in the framework of the ESPON program, because they reveal very different patterns of polycentrism according to the spans of neighbourhood which are chosen by the observer of economic convergence. However, keeping in mind that these tools focus on “potential” flows caused by the structural population and wealth inequalities and not on “effective” flows which depend also on the distribution of functions (functional polycentrism), it will be necessary to introduce empirical verifications to use these methods in an operational framework. An interesting operational use of the MSM could be at this regards the analysis of relative “peaks” and “pits” of population density in Europe, comparing the density of locations in relative terms and not in absolute ones. Indeed, the same level of density does not has the same meaning according to the situation of places in Europe: 100 inhab./km² is a low level of density for places located inside the “blue banana” but a very high level for places located in the northern peripheral regions of Scandinavia.

Territorial Impact Analysis

Originally, **Territorial Impact Assessment (TIA)** has been used in some European countries as a tool for analysing, assessing and evaluating the impacts of certain projects on the spatial development of the surrounding territory. This project-related assessment tool may be considered similar to the Environmental Impact Assessment, although with a wider range of criteria derived from spatial planning documents. Also in this sense the ESPON suggests the application of TIA to transnational projects, e.g. in the area of transport infrastructure.

However, the ESPON programme asked for applying the instrument also to EU policies and programmes – that are originally not being committed to the goals of territorial development but actually influencing it considerably – in order to assess how and to what degree they are affecting the territorial development. In so doing, the ESPON programme is implicitly pushing forward TIA towards goals similar to those of the so named Strategic Environmental Assessment (SEA) of policies and programmes.

Whilst it would be possible to advocate a TIA procedure in addition to existing EIA and SEA procedures it may be more fruitful to integrate them in a common framework, extending the existing procedures to cover social and economic impacts and to include the spatial dimension. This may finally result in a sustainability assessment process that covers programmes and projects, all effects (environmental, social and economic) and the interactions between activities and space over specified time periods.

However, it has been acknowledged that the application of TIA at the programme/policy level suffers by a methodological dilemma: the influence of the selected Community policy intervention cannot or can only roughly be isolated from effects of other measures or influences. Thus, the analysis is restricted to a compilation of the policy measures in certain regions (input side, e.g. financial interventions), recording what spatial development goals they follow and the structural status/changes in these regions (output side) evaluated against the chosen spatial development goals. No direct cause-effect relationships can usually be disentangled.

The ESPON programme defines as objectives, amongst others, i) to show the influence of sector policies on spatial development at the relevant EU scale and ii) to develop methods for the territorial impact assessment of sectoral policies primarily at EU level, but also at the national level, and find appropriate instruments to improve spatial co-ordination of EU sector policies. The extension of TIA to the evaluation of programmes and policies was seen as an important tool in this context, but has been applied only later on within the ESPON 2006 programme and almost immediately its application shown difficulties. Indeed, it turned out that there are considerable constraints against a quick progress due to:

- The actual orientation of EU policy programmes analysed that is still far away from actually taking into account spatial development goals and concepts (and this concerns also the Regional Policy, so far).
- Hence, as a direct consequence of that orientation, there is a dramatic lack of territorial differentiation of policy implementation data.
- Finally, the elaboration of spatial development goals and concepts in the wake of ESDP has hardly achieved operational results appropriate for assessment, so far.

The reports of the ESPON policy impact projects confirm the considerable difficulties caused by the lack of territorial implementation data, and underline the statement concerning the limitations for a common and co-ordinated TIA approach. Therefore, a major recommendation for the future EU sectoral policies (e.g. Transport, R&D, Common Agriculture Policy, Regional Policy) is to provide a monitoring and documentation system encompassing an appropriate regionalisation of policy implementation data.

Although to establish a common TIA methodology to cover the whole range of EU policy issues was not possible, what turned out feasible was to develop **TIA minimum requirements** to be applied to the different areas of concern in specific ways. The requirements cover the different phases of policy assessment – scoping, analysis and assessment – and define the specific questions to be answered to assess the territorial impacts. Specific goals of the territorial assessment include the evaluation of the polycentric spatial development (at European, transnational, national or regional level, as needed) and cohesion issues, encompassing economic, social and territorial cohesion (the latter aiming to fair access for citizens and economic operators to services of general economic interest and the balanced distribution of human activities).

Macroeconomic, Sectoral, Social and Territorial Model (MASST)

The MASST model is an econometric model with the aim to measure the determinants of regional development and regional imbalances; once the causality relationships are

estimated, the model estimates future quantitative changes in regional income and inequality. In fact, the outcome of the MASST model will be different territorial settings of the new Europe based on conditional quali-quantitative hypothesis on future trends of macroeconomic and institutional driving forces; each future territorial setting will define winners and losers, and will identify new levels of regional disparities.

According to the economic logic behind the model, regional growth can be divided into two components:

- a national component, since a national economy influences the dynamics of its regions; positive macroeconomic elements supporting growth at the national level – like low interest rates stimulating investment or low exchange rates creating national competitiveness on international markets – support the development of regional economies;
- a regional component (defined as “differential shift”). National growth is in fact the average growth of all regional economies of a Country. Each regional economic growth differs from the average according to the degree of competitiveness of the local economy. Local competitiveness has traditionally been analysed as dependent on the quality and quantity of local resources such as capital and labour. More recently, much attention has been given to the presence of soft elements, like the efficiency of local institutions, the degree of local synergy among local actors and the cooperation with external bodies; these soft elements are interpreted as the main determinants of local competitiveness, in terms of both productivity and innovation activity performance.

The dynamics of macroeconomic elements, at both the national and local level, will be the result of driving forces of different nature – macroeconomic, technological, institutional, demographic and socio-cultural – represented in the MASST model by various trends and variables. The way the model will integrate these variables will be explained later – the model is still a work in progress at this stage – once the statistical significance of correlation and dependency patterns between the variables has been clarified. Indeed, the MASST model requires a large amount of data at a disaggregated territorial level and in time series. A lot of work has already been achieved in this respect, using different sources, but still some gaps are present and data are missing, as for instance indicators of human, social and physical capital endowments.

The results of the MASST model will be territorial scenarios at NUTS2 level, covering the whole EU25+2+2 countries. Each scenario will be based on general driving forces; the MASST model is in fact unable to provide results for very specific driving forces (like the advent of certain technology rather than another). Single driving force impact forecast will be produced on maps as a first step towards more integrated scenarios. However, the most interesting and crucial outcome of the MASST scenarios will not be these thematic scenarios, but rather cross-thematic scenarios, based on a combination of different hypothesis on the driving forces. Each scenario will be the result of a cause-effect chain, which will influence variables of different nature (demographic, technological, macroeconomic). Each scenario will also be the result of territorial and economic linkages that exists among nations and regions: the former stem from import-export relationships, while the latter are measured via “territorial proximity effects” – i.e. the economic advantages in terms of economic potentials provided to a region by its location in a dynamic and increasingly growing area – and by economic integration potential effects.

Know Trans-European Networks (KTEN)

Based on the results of existing forecast models in different strategic sectors (demography, transport, energy and CO2 emissions), an integrated knowledge tool denominated Know Trans-European Networks (KTEN) is being developed by ESPON Project 3.2. The main aim of this tool is to help policy-analysts explore the sensitivity of main trends to some key variables, and to verify the consistency of scenarios.

The tool takes the form of a “metamodel” based on the results obtained from running advanced models, using pre-calibrated statistical functions and default assumptions etc.. More than black boxes that are only really used by their developers – as many advanced transport models are – KTEN will be developed on spreadsheets (enhanced with Visual Basic programming if needed) and enjoy user-friendly interfaces, to make it a learning experience for end users to the difference of classical forecast models which are often too complex to understand for the non-expert.

Indeed, KTEN is a computer-based policy-interface providing interactive access to advanced forecast and evaluation models. Needless to say, the knowledge tool requires a model behind. Now KTEN is focused on passenger interregional trips, and it has been linked to ongoing databases and modelling exercises led at the EU level by DGTREN (ETIS-BASE). An improvement of KTEN is planned for the near future, to include also freight transport. However, it is important to note that KTEN metamodel does not take into account intra-regional traffic. The latter is often source of congestion, especially in densely populated areas, but current models and databases do not offer a sufficient resolution for evaluating such traffic.

Interactivity is indispensable to make learning possible. It is because of the experience of simulating the impacts of alternative decisions that the user may identify behavioural patterns in the modelled system, but for advanced transport models on-line computation of alternative actions is often not feasible. This is why a new interactive model as KTEN has to be developed based on the pre-calculated results of the advanced one. The crucial element in the design of the knowledge tool is therefore not to oversimplify the model – leading towards inconsistent and misleading answers – but to interface it, or at least break it up into a number of interlinked and manageable policy-relevant modules. At the end the paramount goal is to enable policy makers to integrate the scientific reasoning in the latest steps of the decision making process.

To be more precise, currently KTEN is a simplified passengers' traffic model developed to facilitate a strategic analysis of the trans-European Transport Networks on a wider pan-European and Mediterranean scale. KTEN is a sequential 4-steps model, with combined modal split and assignment of multimodal networks (1 complete run of KTEN takes 150 minutes). KTEN uses STREAM model results, WTO and EUROSTAT Air Traffic OD databases as benchmark and/or reference. KTEN outputs are origin-destination matrices by trip purpose and mode at NUTS2 level for EU27. Assignment is executed using All or Nothing assignment tools on a multimodal graph with specific attributes on transport links and nodes. The metamodel can be used to produce new transport scenarios. The scenario parameters to

calculate generated trips can be entered by region and by country, and the results of trip generation can be visualised also by region or aggregated by trip purpose. The comparison of the results of the model with the values of STREAMS for each region is also available.

The KTEN freight module is being developed as a main interface where the user has to define the major trends and policies. Country relation values embedded in the model structure can be changed to reflect the improvement of commercial relations. Some variables – namely GDP, population and traffic flows – are linked through elasticity parameters that can be altered by the user to reflect decoupling trends due to the effect of transport policies.

European Territorial Cohesion Index (ETCI)

The aim of the ESPON research on a **European Territorial Cohesion Index (ETCI)** is to develop a technical tool for evaluation of scenarios. The initial idea was simply that each scenario should be evaluated in a quantitative way with a synthetic indicator which should take into account the three fundamental objectives of ESDP: economic competitiveness, social cohesion and sustainable development. This synthetic indicator should be better than GDP per capita, but should remain very simple.

In a first round of research the literature on composite indexes (like Human Development Index) has been explored in order to realise a state of the art on the different possible ways to combine different criteria. The focus was mainly on technical questions and used existing data in order to support research but without in depth analysis of the quality of information. This first round of research has produced interesting results from a methodological point of view, but has also demonstrated that it was possible to introduce strong manipulations in the results, which make these synthetic indexes too poorly reliable to be substituted to GDP per capita in practical decisions (as for instance the eligibility of regions for Structural Funds distribution).

In the second round of research developed since January 2005 the research on statistical and cartographic tools has been postponed in order to focus more on the availability of data which could be used for the development of a composite index, taking into account the three dimensions of ESDP and the definition of territorial cohesion. This analysis of the data situation in regard to political expectations on territorial cohesion led to the pessimistic conclusion that it is probably not possible to build any relevant index of territorial cohesion in the framework of the ESPON database. Indeed, only the economic dimension appears to be well documented, but very little information are available at regional level for the evaluation of environmental sustainability and practically nothing for social cohesion. This pessimistic conclusion – confirmed by the analysis of the ESPON core indicators state of the art (see below) – claims for further research to explore different ways to complete the ESPON database by new measures of social cohesion.

Long-Term Database (LTDB)

The aim of the **Long Term Database (LTDB)** is not to collect an important number of indicators but to focus on the most useful and general criteria which can be a basis for the

elaboration of political scenarios. The most interesting data which were expected to be harmonised during the year 2005 include time series covering the periods 1960-65, 1980-89, 1995-2005 and forecasts for the period 2020-2040 for the following data:

- Demography: total population, structure by age and sex, births, deaths.
- Active population: total and by sector
- GDP: total and by sector.

These data are to be collected mostly at NUTS 2-3 level (but the target areas for population structure data of the period 1995-2005 are NUTS 3-5).

The diversity of the data to be collected is apparently limited but it is important to consider that some of them are very expensive (age and sex structure, births and deaths by five years periods) and that all target variables are raw count variables which can be combined together in order to produce a great diversity of indicators of high interest for territorial planning. For example, the estimated expectancy of life can be deduced from the combination between age structure and deaths, through the application of a standard life table. Apparent migration rate can also be deduced from the combination between population at different time periods and natural increase. Both indexes would be very useful for the measure of territorial cohesion in long term perspective, by using an European Territorial Cohesion Index (see above). Concerning economic competitiveness, all classical combinations of GDP with total population, active population, economic sectors etc. can be deduced from basic information, providing a long term view of the economic evolution of Europe. What is really missing is the environmental dimension.

However, the most difficult problem to be solved is probably not the collection of numbers (which are available in most cases) but the precise identification of territorial units which are characterised by these figures. The crucial problem for LTDB is to identify very precisely the timetable of administrative change of territorial units in all states of the ESPON area. The fact that the name of a territorial unit remains the same is not necessarily a guarantee that the spatial extension also remains the same. The situation is different for big and small changes of territorial units:

- **Dramatic changes of territorial units** are obvious problems for data harmonisation because they oblige to produce estimations or to introduce very expensive data collection at lower level like NUT5. But at least they are obvious and clearly identified problems, less dangerous of ...
- **Small changes in territorial units**, which are not depicted on maps but can produce very important changes on statistical results, especially in case of measures of evolution. The typical situation is the case of metropolitan areas which enlarge their administrative territory at a given period of time, but without changing their name: the increase of territory produces an important increase of raw count variables (population, GDP, etc.) and an equivalent important decrease in the neighbouring regions which have lost part of their territory. As the territorial change is very limited, it is not necessarily visible on maps (which are not necessarily revised) and it can be ignored by the author of the database if he/she has not a perfect knowledge of administrative changes at all levels. As a result, significant variations could be observed which are not due to real demographic or economic drivers, but simply to the modification of territorial divisions.

Due to this problem of changing territorial units over time, it is not immediately possible to produce maps of the evolution of the data included in the LTDB because the information on

territorial units are collected “as they are” at the time period of elaboration. When we look at the administrative situation of territorial units of the ESPON space in 1980 and 2000, we can observe that some states have kept more or less the same administrative divisions (France, Belgium, Spain, Italy, Hungary, Romania ...) but that an important minority of states has completely changed the NUTS2-NUTS3 divisions. These can not be properly recovered without a full disaggregation at NUTS5 level which would be very expensive and is even not sufficient in certain cases where local units have also been modified.

This task of precise reformulation of old databases in current administrative division is clearly not for ESPON and is rather relevant for national statistical institutes, EUROSTAT or the INSPIRE programme. ESPON may help to solve the problem by making a survey on the historical evolution of administrative divisions in all states of the ESPON area.

Data availability problems and the ESPON Data Navigator

A general problem which reduces the potentiality of all the above mentioned ESPON tools and methodologies is the shortage of detailed data. Indeed, after a careful analysis of the available data in Eurostat, ESPON and in the OECD statistics, the authors of ESPON Project 3.2 concluded that:

- the most disaggregated territorial level which can be achieved without incurring in unmanageable gaps of data is NUTS2 level;
- the first year of analysis that can be taken into account for a consistent time series analysis is 1995: before that year, NUTS2 data for the Eastern Countries are not available.

Available data cover the economic and environmental dimensions, but the social dimension is missing. In fact only 4 of the 103 ESPON core indicators can be considered as social: pupils by educational level; educational level of population; unemployment rates; impact of accessibility changes on unemployment. There are other indicators indirectly related to the social dimension, for instance the diffusion of Internet or cellular phones, or the proportion of households with PCs. But what are missing are truly social indicators, as for example: wages disparities, share of teen-agers leaving the school without any qualification, life expectancy.

This lack of social indicators has to be seen also as an unintended consequence of the focus of the Lisbon Strategy on the economic dimension. The situation is not so critical for the environmental dimension as for the social dimension, because the European Environmental Agency and the EC Joint Research Centre are able to deliver regular environmental information of good quality which can support policy orientations concerning the European environment. In the social field, instead, adequate statistical information is not available, and it is impossible to develop a policy without good indicators for ex-ante and ex-post evaluation.

Although the mentioned data problems cannot be solved only in the context of the ESPON programme (the solution can be provided in the wider context of the INSPIRE initiative, see chapter 3 below), ESPON project 4.1 has produced an useful Internet search tool which allows to identify the existing data, the so named **Data Navigator**. This is a rather simple and user-friendly tool, which allows to make queries through a structure of hyperlinks

defined according to the following search keys: countries, themes, sub-themes, NUTS levels, maps. The tool provides references in terms of sources, links, addresses and other useful information in order to get data/information related to the themes dealt in all the ESPON Projects.

The Data Navigator covers the information available from official sources in the countries of four main areas:

- the EU15 Member States, plus Norway and Switzerland.
- Baltic Sea area (Estonia, Latvia, Lithuania, Poland and Belarussia).
- CADSES area (Bulgaria, Czech Republic, Hungary, Romania, Slovakia, Slovenia, Albania, Bosnia-Herzegovina, Serbia-Montenegro, Moldavia, Ukraine).
- Mediterranean countries (Morocco, Algeria, Tunisia, Libya, Egypt, Israel, Palestine, Syria, Jordan, Turkey Malta, Cyprus).

Where available the details on the source of data are well described, including complete references of the data producers: source, contact details and email address. Not all the themes are equally treated pointing out the problem of harmonised statistics and data availability for some countries. So, themes like "Telecommunication and information society" and "Cultural Site" show very few cases. In contrast, categories more exhaustive are: "Agriculture", "Employment and labour Market", "Population", "Transport" and "Wealth and Production". The quantity of information provided for the different countries is also very uneven: it goes from only one item for Moldova to 571 items for Cyprus. Amount of data according to NUTS levels varies considerably, and a lack of information is visible mainly for NUTS4 and NUTS5.

3. How to overcome data shortages: exploit the linkages with INSPIRE, GEOSS and GMES

What is the INSPIRE initiative

INSPIRE is an initiative launched in 2001 by the Commission to support the availability of spatial information for the formulation, implementation and evaluation of European Union policies. The initiative was based on the observation that the accessibility, interoperability and affordability of spatial data and information systems were limited. It was generally recognised that this situation prevents society to fully benefit from the potential of the technology to improve the relevancy, accuracy, impact and public control of territorial policies and related decisions at all scales and to involve citizens, businesses, non governmental and research organisations in a participatory information society.

With the INSPIRE initiative the European Union – in collaboration with all the relevant stakeholders – intends to establish an infrastructure for spatial information in Europe that will allow the public sector users at the European, national, regional and local level to share spatial data from a wide range of sources in an interoperable way for the execution of a variety of public tasks at conditions which do not restrain its use. Moreover, users in private, research and NGO-organisations and the citizens will be offered services to discover, access and view these spatial data sources. INSPIRE has been initially focused on environmental policy needs but, being a cross-sectoral initiative, will gradually be extended to other sectors (e.g. agriculture, transport, etc.) as other interested Commission services participate.

In order to develop the INSPIRE legislation, all geographical information stakeholders were mobilised in relevant working groups to prepare and INSPIRE proposal for a Directive. Mid 2004 the proposal for a Directive of the European Parliament and of the Council – Establishing an infrastructure for spatial information in the Community – saw light.

The INSPIRE initiative recognises the fact that most of the quality spatial information is available at local and regional level, but that this information is difficult to exploit in a broader context for a variety of reasons. The situation on spatial information in Europe is one of fragmentation, gaps in availability of geographical information, duplication of information collection and problems of identifying, accessing or using data that is available. As a result of these problems, effective EU policy actions suffer because of lack of monitoring and assessment capabilities that take into account the spatial dimension.

Indeed, the data are often of unsatisfactory or undefined quality, based on proprietary geographic information systems and not accessible to the public or other users at local, regional, national and international level. Therefore, projects that combine data coming from various sources to provide policy-relevant information and tools are often time consuming and costly. Policies need to be put in place to reduce the duplication in collection, harmonisation efforts and to facilitate and promote wide dissemination of the data. These policies should free funds to be invested in improving the availability and quality of spatial information.

The INSPIRE implementation is following a step-wise approach:

- The **first step** focuses on harmonisation of documenting existing datasets (metadata) and on the tools needed to make this documentation accessible.
- The **second step** will primarily aim at providing common ways to access the spatial data sets themselves allowing uncomplicated analysis of data on different themes coming from different sources. An example of such analysis is the visual inspection of spatial relations between phenomena by overlay of datasets.
- The **third step** will target the establishment of common models of the objects in the environment for which spatial data is collected, such as transport networks, forests, etc.. This will allow to map existing datasets to a common set of models, starting in this way to create a really harmonised spatial data infrastructure that will facilitate the combination of information of various sources and more advanced analysis work.
- The **fourth and last step** will build upon the previous steps and concentrate on completing the common models and on providing the services to fully integrate data from various sources and various levels, from the local to the European level into coherent seamless datasets supporting the same standards and protocols. This step will allow real time access to up-to-date data across the whole of Europe.

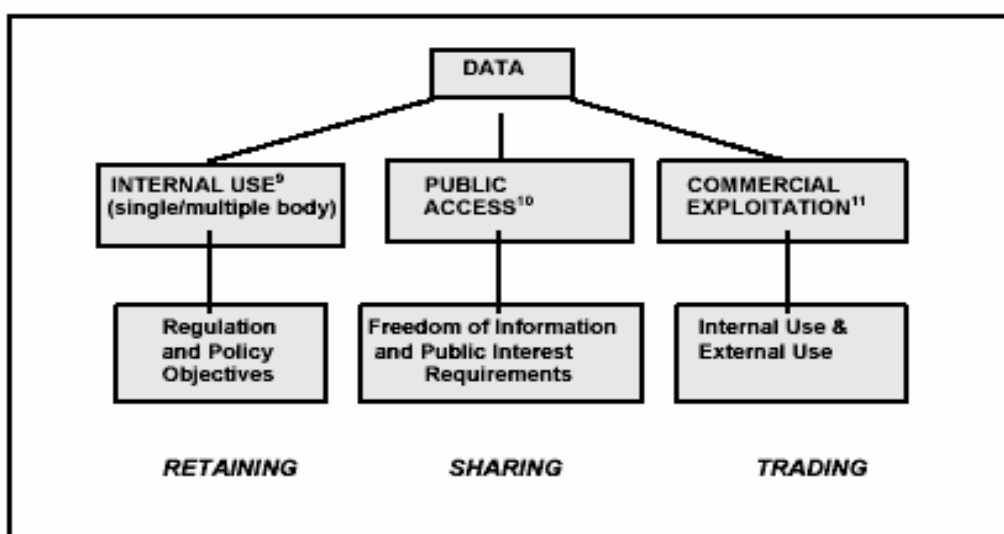
As mentioned above, INSPIRE is conceived as a cross-sectoral initiative covering the main Community sectors with a spatial impact such as transport, energy, agriculture, etc., but will target initially information needed to support environmental policy. Environmental thematic user needs have been identified in an INSPIRE position paper⁴, whose main conclusions are relevant and briefly summarised below.

Environmental user needs

Environmental data users are many and various, and include users who need spatial data for planning, management, assessment, monitoring and reporting: governments & administrations, utility and public services, R&D organisations, commercial and professional end users (e.g. property developers), NGOs and citizens. The producers of spatial information within the public sector include national environmental protection agencies, national geological surveys, national maritime administrations, cadastral, land registration and other land administration organisations, local authorities and utilities. It should also be noted that, under certain circumstances, private data producers may offer production capacity to public bodies, or possibly sell data directly onto the market themselves.

Most spatially organised data and information are either used internally by public bodies, or are supplied to other public sector organisations under various types of agreement. A relatively small but growing number of government departments or agencies conduct commercial business with the private sector or with the general public. At this regard it is important to recognise the difference between retaining, sharing and trading data, which is illustrated in the following diagram:

⁴ Cfr INSPIRE Environmental Thematic Coordination Group, Environmental Thematic User Needs Position Paper, EEA, 2002



The diagram shows three data transaction streams:

- **Internal use** means spatial information used exclusively within the originating public body, or shared among any public body at local, regional, national or international level, therefore “retained” within the public sector.
- **Public access** means spatial information provided by public bodies free of charge or at a marginal cost of supply for viewing or use by citizens of the European Union (including NGOs, academia, and research institutes), therefore “shared” with a wide arena of users.
- **Commercial exploitation** means the utilisation of public sector spatial information in commercial information products, therefore “traded” on the market.

The assessment of spatial data needs for the environmental sector has been structured according to the following list of environmental themes:

- Water: inland water and marine environment
- Air and climate change
- Biodiversity and nature protection
- Soil and land
- Waste
- Noise
- Health
- Natural and technological hazards
- Coast – example of integrated regional approach
- Urban and local planning, environmental impact assessment
- Transport and environment

Environmental data needs have been identified at two levels of use:

- **High level:** the policy evaluation, monitoring, indicator level, both obligatory and by voluntary agreement, the assessment focusing in this case on driving forces, pressures, impact, state and responses;

- **Local level:** the implementation and management level, such as environmental management of water, air, soil, land use planning, regional planning, risks assessment etc..

Typical characteristics of data needed at the high level of policy development and evaluation as identified through the assessment are:

- very small scale (aggregate) data for the visualisation of statistical information
- small scale data, e.g. 1:1 million for overall assessment and modelling
- full coverage of data at small scales and detailed data for case studies. However, the access to spatial data is difficult at present, also concerning data at small scales
- historical data and updates are necessary
- products derived from data analysis are based on generalised maps of the temporal and spatial distribution of phenomena or on information based models where several data are joined together.

Local level needs require more detailed data to support coastal zone integrated management, river basin management, land use and urban plans, environmental impact assessment of projects etc. EIA projects in particular require substantial data collection of valuable thematic data, and the reuse of the information is commonly inhibited by management of internal character, missing information about the existence and user rights constraints.

In order to assess the future data development needs for the environmental sector, a pragmatic approach has been adopted by categorising data into **spatial data themes**, subdivided into **spatial data components** for which a number of **spatial datasets** can be identified. The thematic structure is therefore divided into 20 main thematic areas, and these are further split into 60 spatial data components, being broad categories of related data.

The table on the following pages shows in the rows the spatial components and in the columns the linkages to important policy priorities:

- European legislation and international legal obligations
- Environmental policy focus
- European agreements on environmental analysis (indicator)
- Health and social security/risk management – local level
- Needs in local planning, EIA, integrated management.

The last two columns of the table illustrate the data categories – identifying reference data, core thematic data, environmental sector data and other sector data – and the priorities given to data implementation in the INSPIRE framework of action (divided in high, medium and low priority). The thematic structure is not fixed – new categories of data can be added at all levels. However, the thematic structure and the defined set of spatial data components defined in the table was based on a broad assessment, and they were useful as a basis for the initial development phase of INSPIRE. After this initial phase, a periodic review of the structure, e.g. 3 years, is envisaged.

	Env. legislation - geo-	Env. policy focus, EAP	Env. assessment/ ind.	Env. health-security	Local planning/ manag.	Multi-sector - important	Reference/ comments	INSPIRE category *	INSPIRE priority **
Geographical location									
Geodetic reference system			x	x	x	x	basic info for all	REF	H
Geographical grids			x					TC	H
Monitoring sites	x	x	x		x	x	WFD,CAFE, ++	ENV	H
Geographical names								REF	H
Administrative units									
Official administrative units	x	x	x	x	x	x		REF	H
Blocks and census districts			x		x	x		REF	M
General government management units			x	x	x	x		S	H
Sector management & reporting units	x	x	x				N2000,wfd,++	E/S	H
Properties, buildings and addresses									
Properties				?	x	x		REF	L
Buildings				x	x	x		REF	L
Addresses				x	x	x		REF	H
Elevation									
Elevation			x	x	x	x	WFD	REF	H
Bathymetry			x		x	x		REF	H
Coastline			x		x	x	WFD	REF	H
Geo-physical environment									
Bedrock geology						x		TC	L
Geo-morphology			x					?	L
Soil		x	x					TC	H
Climate									
Climate zones			x					ENV	L
Hydrography									
Hydrography, river, lake....	x		x	x	x	x	WFD	REF	H
Water catchments	x		x	x	x	x	WFD	TC	H
Groundwater bodies/aquifers	x		x	x	x	x	WFD	ENV	H
Ocean and seas									
Sea regions			x					ENV	L
Biota/biodiversity									
Biomes/ Bio-ecological regions		x	x				N2000	TC	H
Vegetation			x		x			TC	L
Habitats and biotopes		x	x				N2000	ENV	M
Species distribution		x	x				N2000	ENV	M
Land surface									
Land cover		x	x	x	x	x		TC	H
Ortho-images			x	x	x	x	EEA	REF	H
Unclassified satellite data			x			x		TC	M
Natural resource									
Water resources		x	x		x	x		E/S	M
Agricultural land and soil resources			x		x	x		S	H
Forest resources			x		x	x		S	H
Fishery resources		x	x		x	x		S	M
Geological resources			x		x	x		S	M
Renewable energy resources			x		x	x		S	M
Transport									
Transport networks		x	x	x	x	x	all sector need	REF	H
Transport facilities			x					REF	L
Utilities									
Transmission lines			x					TC	M

* Categories : REF = reference, TC = Core thematic, ENV = Environmental sector, S = Other sector

** INSPIRE Priority : H = high, M = medium, L = low

	Env. legislation -geo-	Env. policy focus.EAP	Env. assessment/ ind.	Env. health-security	Local planning/managed	Multi-sector-impofiant	Reference/ comments	INSPIRE category *	INSPIRE priority **
Facilities									
Environmental protection facilities, inciner+	?	x	x	x			WFD, landfill dir	TC	M
Production facilities: industry+	?	x	x	x			WFD,	TC	M
Agricultural facilities, stores, tanks, dams+	?	x	x	x			WFD,	S	M
Economy									
Economic statistics/local statistics			x					E/S	H
Area regulation									
Land regulation/land use plan		x	x	x	x	x	6EAP, coast,urb	TC	H
Protected sites	x		x		x	x	Natura2000	TC	H
Sector regulation (env. sector/ other sector)		x	x	x	x	x		E/S	H
Natural and technological risks									
Natural risk vulnerability zones		x	x	x	x	x	6EAP	ENV	H
Technological risk vulnerability zones	x	x	x	x	x	x	6EAP	ENV	H
Technological accidents/ natural disasters			x	x	x	x		ENV	L
Polluted areas/areas under anthropogenic stress									
Local contaminated areas		x	x		x	x	WFD,	ENV	H
Diffuse contamination			x				EEA	ENV	M
Noise zones		x			x		6EAP	ENV	L
Society									
Demography			x	x	x	x		TC	H
Green urban areas		x	x				6EAP, urban	ENV	M
Derelicted urban land		x	x				urban	ENV	M
Cultural heritage					x	x		ENV	L
Natural amenities	x	x	x				WFD, bathing	ENV	L
Health									
Epidemiology		x		x			6EAP	S	L
Health services				x	x	x		S	L

The INSPIRE implementation process

The INSPIRE working group on environmental data needs has identified the need for a two-track approach for fulfilling user needs following the implementation of environmental policies:

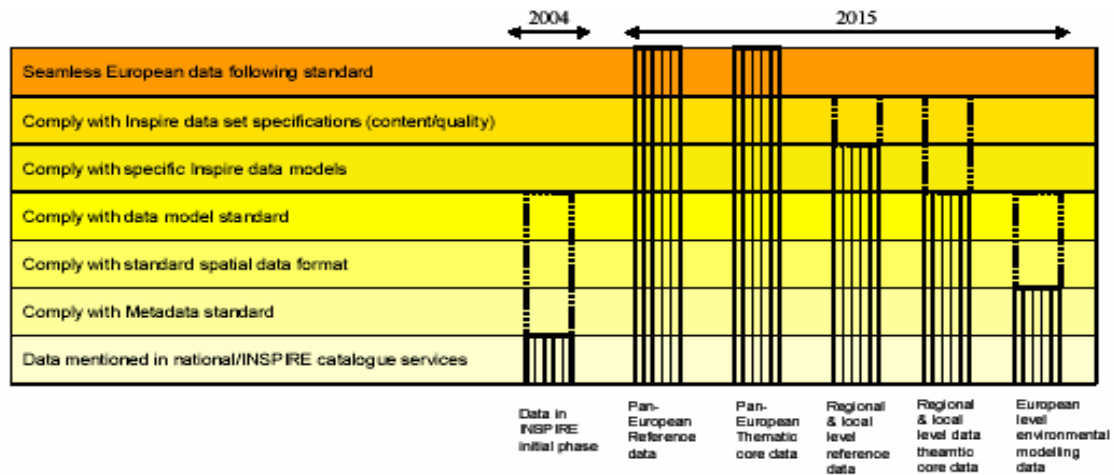
- For data components used at the local and regional level there is a need for high-resolution data which should be covered by the production of data at the local level, with a possible generalisation of data to also fulfil needs at the higher levels. However, generalisation based on harmonised local level data can only be achieved in the long run given the diversity of data and systems at the local level.
- INSPIRE should also facilitate production of national and European-scale data. For data components used at the national and European levels, needs for more general data should, until harmonised data becomes available at local and regional level, rely on production at this scale. Commonly, data production organised at national levels fulfils these needs. Data from national levels should be generalised into European-level data wherever feasible, but existing European-scale data should be maintained separately as long as fully automated generalisation is not feasible.

As it concerns the implementation of the overall INSPIRE system, it is envisaged that producers/owners/custodians of environmental data wanting to give access to data to the INSPIRE infrastructure have either to load data to an external/central data repository, or establish and maintain its own server facilities. In the long term it is expected that thousands of data repositories will be linked to the infrastructure, established by European, national, regional and local authorities, private companies or other kinds of spatial data custodians. Any organisation establishing a data repository complying with the specifications defined by INSPIRE can be linked to the infrastructure. It is not foreseen that environmental sector users or other users need special software or hardware to download data from the infrastructure.

In order to let data custodians make spatial data available through the infrastructure, INSPIRE should develop as a first step a web catalogue system which directly read the metadata being part of the data sets and present the information, the datasets and the metadata being placed in distributed data repositories. It should be as a minimum requirement be possible to search for and locate data according to thematic content, scale/accuracy, owner/custodian, distributor or by geographical location. The system should be implemented and in operation in the European Commission and at Member States level by 2007.

Spatial data, including metadata, should be loaded to data repositories complying with INSPIRE technical and legal specifications. It is expected that the EC will establish and maintain at least one data repository by 2005, and that all major spatial data producers at the central European level will establish and maintain spatial data repositories following INSPIRE specifications by 2008. It is expected that each Member State establish and maintain at least one similar data repository by 2006, to load priority reference and thematic core data to the infrastructure, and that major spatial data producers within each MS establishes and maintains spatial data repositories or have agreements with external data repositories for provision of their most needed reference and core thematic data, to be implemented by 2010.

All the process should be ended by 2015. The figure below illustrates how products having different status in INSPIRE will fulfil different levels of harmonisation and quality when they are to be loaded on data repositories in the INSPIRE infrastructure. In the initial phases of INSPIRE it is expected that only existing data are shown in INSPIRE web catalogues, while full harmonisation it is expected by 2015 at latest.



Besides describing the overall process of INSPIRE implementation related to environmental data needs, the environmental needs assessment working group has issued some specific recommendations which are relevant for identifying potential complementarities with the ESPON programme.

One major group of data of prime importance to environmental users is basic features, commonly termed **reference data**. The availability of reference data is crucial as they are to be used in combination with thematic data, as a basis for environmental analysis and map presentation. Recommendations are given on how to populate the INSPIRE reference data for two broad levels of use:

- Small scale (aggregate) data for overall use at national, cross-national and European level
- Medium to large scale (disaggregated) data to be used at regional and local levels.

There is a very high need for data at small scales, 1:1 million or smaller in accuracy. It was recommended⁵ that the Commission develops and maintains a small-scale seamless reference data base with a Pan-European coverage, due to be implemented by 2005. The data base should at a minimum contain the following elements:

- Elevation and bathymetry in respect to land and sea
- Administrative boundaries NUTS 0-5
- Coastline and hydrography, river catchments
- Main categories of land cover
- Main cities and settlements
- Transport (networks and nodes)
- Geographical names
- Grids (1x1 and coarser grids)

The data should contain relevant, officially agreed ID's for easy linking to official statistics and other main statistics which are agreed to be reported/generated at the European level.

There is a very high need for spatial reference data to be used at medium to large scales too (scale ranging from 1:250.000 downwards to 1:25.000). Very large scale data at even higher geometrical accuracy (1:5000 – 1:500) could also be considered as constituents parts of INSPIRE. But European initiated harmonisation targets will be far less demanding than on

⁵ Cfr. INSPIRE ETC, Environmental Thematic User Needs Position Paper, Page 67

smaller scales, as the data are not primarily being exchanged outside the national level, and in many cases not even outside the regional level. Therefore, the target for minimum area coverage for very large scale data should be defined by INSPIRE taking into account the need to cover urban areas and areas under particular stress (e.g. industrial sites, coastal tourist areas, agricultural areas.).

Similar recommendations have been given for the other categories of core thematic and environmental data.

The GEOSS and GMES initiatives

Where relevant, synergies of INSPIRE with the GEOSS and GMES initiatives will be sought in order to ensure coherence of the spatial data infrastructure with the availability of information from earth observation.

During its ten-year implementation period launched in the year 2004, the **Global Earth Observation System of Systems (GEOSS)** will provide new impetus for Earth Observation (EO) research.⁶

The GEOSS Ten-Year Implementation Plan Reference Document specifies a two-year period to facilitate the development and availability of data, metadata and products, including base maps and common socio-economic data, commonly required across the nine GEOSS societal benefit areas:

- Disaster reduction
- Climate change
- Health
- Biodiversity
- Water management
- Ecosystems
- Weather forecasting
- Agriculture and desertification
- Energy management

Within the next six years, 2006-2011, GEOSS will target data management facilitation approaches within the different societal benefit areas, encompassing a great part of the EO data life cycle, from input through data acquisition, processing, archiving and dissemination.

The Seventh Framework Programme (FP7), set to run from 2007 to 2013, will support the GEOSS implementation plan, strengthening the links with EU environmental research, which includes work on disaster reduction and climate change, as well other GEOSS benefit areas. In this context, the elaboration of data information systems that bring together data from all EO platforms, ground-based, airborne and space-based, is a first pragmatic objective of GEOSS. Operational data information systems will permit better exchange, dissemination and archiving of shared data, metadata and products. These systems are essential for the

⁶ see http://europa.eu.int/comm/research/environment/geo/article_2450_en.htm

scientific assessment and modelling of environmental phenomena, and are the only instruments able to support prediction of events and their impact on the human activity.

The objective of the **Global Monitoring for Environment and Security (GMES)** initiative is to provide information and customised services, based on space and non-space observations (airborne, water-based and ground-based) to a variety of user communities in the public and private domain. The European Commission has established an Action Plan in 2004, which envisages an operational GMES core capacity starting in 2008. GMES demonstrator projects, many of which address environmental issues, are already supported under the FP6 "Aeronautics and Space" priority and by ESA funding.

One of the thematic areas being addressed by ESA in the frame of GMES is the monitoring of urban areas in Europe, covering issues related to urban areas as urban sprawl, urban planning models and forecasts, changes in urban land use, environmental monitoring, urban planning discipline enforcement, etc. . The GMES Urban Services (GUS) project (2003-2004) aimed to demonstrate a portfolio of products derived from satellite data and other sources in cooperation with a selection of users (cities and regional authorities) as a starting point for the full implementation of a GMES service by 2008. These products are oriented to serve the strategic urban planning needs all over Europe, and are clustered into four blocks:

- Land use, including change detection and modelling tools.
- Urban development control, including short term hot spot monitoring for urban planning discipline enforcement.
- Environmental quality, including noise, sealing, thermography & risk.
- Regional products, including the observation of basic land use and sealing maps for monitoring of soil consumption.

GMES and GEOSS share a range of strategic and technical issues and offer opportunities for interactions, e.g. space and non-space observation platform, data exchanges and network connections, integration of observations, ad-hoc campaigns.

Potential complementarities of ESPON with INSPIRE and GEOSS/GMES

It is obvious that there are a lot of potential complementarities of ESPON with the INSPIRE and GEOSS/GMES initiatives.

In general terms, the implementation of these spatial data gathering activities will help to solve the data shortage problems that affect spatial analysis tasks in Europe today. Therefore, ESPON can only benefit from a coherent implementation of the INSPIRE spatial data infrastructure.

Indeed, the ESPON programme and community of researchers can also actively cooperate to the implementation of INSPIRE, by forming a specific Spatial Data Interest Community (SDIC) for this purpose. Actually there are already many sectoral, thematic or regional communities of data users and stakeholders involved in the preparation and implementation activities of INSPIRE.

The main aims of the cooperation with INSPIRE could be for instance:

- to exploit the Data Navigator tool to provide INSPIRE with an already working web catalogue;
- to assess and plan the availability of environmental data from the INSPIRE infrastructure that could feed ESPON research activities in the years to come;
- to assess the data needs in fields other than the environmental sector, and especially of territorial information on economic and social aspects that will be needed to assess the territorial cohesion and polycentric development of Europe.

The focus on territorial cohesion can help to improve the availability of data on the accessibility of essential services all over Europe, by concentrating the INSPIRE efforts not only on environmental data, but also on the collection and harmonisation of statistics for local, regional and national management of public services (education, health, urban planning etc.). In this context, also urban level data supplied by GMES services can be particularly useful and relevant.

A more specific appraisal of possible interactions at the level of single ESPON products is provided in the table below:

ESPON Products:	Potential complementarities of ESPON products with:		
	Data Infrastructure Programmes		
	INSPIRE	GEOSS	GMES
Territorial cohesion / polycentrism			
ESPON database/ core indicators	The ESPON database may become an official data repository		
GIS orientated instruments	ESPON GIS instruments may be used to facilitate the access and mapping of INSPIRE datasets		
Regional Classification of Europe			
Spatial Analysis Tools	Solutions to the Modifiable Area Unit Problem may be found that help to obtain time series data. Multiscalar Smoothing Methods may be applied as well to produce comparable historical data		
Territorial Impact Analysis			
MASST			
KTEN			
ETCI			
Long-Term database	This may become an official data repository		

Data Navigator	This may be used by INSPIRE as a component of the web data catalogue		
----------------	--	--	--

4. Potential linkages of ESPON with other EU Research activities for EU policy impact assessment

Another relevant field of interaction for the ESPON programme relates to the need of monitoring EU policies and strategies by means of indicators development activities, and to assess the economic, social and environmental impacts of EU sectoral policies.

We will refer here in particular to:

- The need to monitor the implementation of the EU Sustainable Development Strategy by means of sustainable development indicators to be compiled at national and regional level, and the contribution that ESPON can give to this task.
- The need to assess the impact of EU regulations and sectoral policies in relation to sustainability goals, encompassing the economic, social and environmental dimensions, and the role that the ESPON Territorial Impact Assessment methodologies may play together with the Sustainability Impact Assessment and Strategic Environmental Assessment tools currently under development in the context of the EU Research Frameworks.

The need to monitor the competitiveness, growth and social cohesion of the European cities by means of urban indicators, and the connection with the Urban Audit initiative in this respect, will be discussed later in chapter 6.

Monitoring the EU Sustainable Development Strategy

The Strategy for Sustainable Development adopted by the European Council in Gothenburg in June 2001 sets out a commitment to regular monitoring. Indicators for monitoring long-term progress towards “meeting the needs of the present generation without compromising the ability of future generations to meet their needs” are needed to assist decision-makers and inform the general public about achievements, trade-offs and failures in attaining the commonly agreed objectives of sustainable development.

The recent Communication from Mr. Almunia to the Members of the Commission⁷ presented the state of play of the Commission’s reflections on possible indicators for monitoring the implementation of the EU Sustainable Development Strategy (SDS), including a list of Sustainable Development Indicators (SDI). At the current stage EU indicators have been selected only for the purpose of evaluating the EU SDS, and therefore they are not *a priori* suited to serve national or regional purposes, in relation to national or regional sustainable development strategies.

The purpose of indicators is to monitor progress achieved by the implementation of policy measures towards policy goals and objectives. Inevitably, this implies that the framework

⁷ SEC(2005) 161 final, “Sustainable Development Indicators to monitor the implementation of the EU Sustainable Development Strategy”, Brussels, 9-2-2005.

and the set of SDI have to be flexible to adjust to possible changes in policy priorities and objectives, for instance in line with issues emerging after the Strategy's review planned for 2005. Tight policy linkages assure user relevancy and effective utilization of indicators in decision-making. In this context, the framework provides a structured approach to policy areas and forms a consistent communication tool between various stakeholders in the EU. The indicators are framed according to ten SD themes:

1. Economic development
2. Poverty and social exclusion
3. Ageing society
4. Public health
5. Climate change and energy
6. Production and consumption patterns
7. Management of natural resources
8. Transport
9. Good governance
10. Global partnership

The themes are further divided into sub-themes and "areas to be addressed". The sub-themes usually monitor the progress towards the headline objectives while the areas to be addressed facilitate a more detailed and diversified analysis of background factors in each theme.

In accordance with this hierarchy of themes, sub-themes and areas, the indicator set is built as a three-level pyramid⁸:

- **Level 1:** consists of a set of 12 high level indicators allowing an initial analysis of the theme development.
- **Level 2:** corresponds to the sub-themes of the framework and, together with Level 1 indicators, monitors progress in achieving the headline policy objectives. These 45 indicators are aimed at evaluation of the core policy areas and communication with the general public.
- **Level 3:** corresponds to the areas to be addressed, i.e. various measures implementing the headline objectives, and facilitates a deeper insight into special issues in the theme. Therefore, these 98 indicators are aimed at further policy analysis and better understanding of the trends and complexity of issues associated with the theme or inter-linkages with other themes of the framework. They are intended for a more specialised audience.

All in all, the preliminary set of SDI – consisting of 12 headline, 45 core policy and 98 analytical indicators – forms a basis for regular monitoring of progress in the headline objectives of the Sustainable Development Strategy and the other core EU policy documents. The indicators capture the essence of the theme developments and are easily understandable and responsive to policy interventions. However, the EU SD strategy and core EU policy documents encompass several priority areas on which no information or only

⁸ The indicators are described in the Annex to the mentioned Communication, and not repeated here for the sake of brevity.

partial information is available, especially – as noted also above when appraising the state of art of the ESPON core indicators – in the social dimension. To overcome this technical constraint and assure the production and compilation of the necessary data for policy making in a longer perspective, the list of SDI divides the indicators into two categories, “best available” and “best needed”.

The “best available” indicators refer to indicators that can be compiled on the basis of existing data. Nevertheless, some of these indicators may not be the ideal indicators for sustainable development policy issues, but serve as proxies for the ideal ones, the so-called “best needed” indicators. Some of the indicators may also be classified as “best needed” due to data quality problems. Consequently, the “best needed” indicators are indicators for which:

- data and/or methodology do not exist yet
- data exist, but the quality is poor or unknown or does not allow publication
- data exist, but the breakdowns needed are not yet available.

The Commission departments, and the European Statistical System, will continue to develop new indicators and improve the quality of the existing indicators included in the list. The sustainable development indicators will be made available on the EUROSTAT website.

In addition to this, an EU 6th Research Framework task, under Priority 8 Support to Policies, is now starting aiming to “assessing interlinkages between different priorities of the Sustainable Development Strategy”. The task description is as follows:

“Develop methods and indicators for assessing the progress towards Sustainable Development in view of developing ‘best-needed’ indicators that require research work in order to be developed on a regular basis. The research should build on existing work including indicator development by EUROSTAT and other relevant European and international organisations. Tools and methods should be provided which allow the elaboration of forecasts on the basis of available scenarios, and the identification of inter-relationships between selected unsustainable trends in order to explore potential synergies and trade-offs. Potential analytical frameworks to assess interlinkages between trends should be examined, with the aim of comparing the merits of different approaches and making recommendations for their use in monitoring and policy making.”

This research task is clearly similar to tasks of analysis of development trends that are currently within the scope of the ESPON research.

Impact assessment of EU policies and the EU Research to develop SIA and SEA methods.

The White Paper of governance of the European Commission (2001) introduced a new impact assessment method of EU policies and regulations. This method is deemed to be comprehensive, integrating all sectoral assessments concerning direct and indirect impacts of a proposed measure into one global instrument. It provides a common set of basic questions, minimum analytical standards and a common reporting format. The impact assessment will replace existing requirements for business impact assessment, gender

assessment, environmental assessment, trade impact assessment, regulatory impact assessment etc.

In June 2002 the Commission published a Communication on the Impact Assessment procedure. According to that, the impact assessment runs in two phases: the “preliminary assessment” gives a first overview of the problem identified, possible options and sectors affected and serve as a filter to identify the proposals that will be subject to an “extended impact assessment”. The extended impact assessment is a more in-depth analysis of the potential impacts on the economy, the society and environment of regulatory initiatives, the analysis of subsidiarity and proportionality and it includes consultations with interested parties and relevant experts. The year 2004 was the first year of implementation of this new impact assessment procedure.

In order to refine the methodologies to serve such integrated assessment needs, there are some areas of EU Research which deal with “Sustainability Impact Assessment (SIA)” tools and “Strategic Environmental Assessment (SEA)” methods. Obviously this research activity is not only useful for the European Commission impact assessment needs, but also for the evaluation of sustainability of policies and programmes undertaken at national and regional level. The main difference between SIA and SEA is that the former encompasses all the sustainability dimensions – economic, social and environmental – while the latter is focused on the environmental effects and costs of policies. In what follows we will briefly describe the SIA and SEA related EU research activities, while the potential connection with the Territorial Impact Assessment advocated by ESPON will be discussed in the next section.

Indeed, over the years, the European Union has launched research programmes and created integrated tools to support policy making at all levels, putting sophisticated impact assessment and monitoring tools – and state of the art research findings – at the disposal of all stakeholders throughout Europe. In particular, **EU environmental research** for the sustainability impact assessment of land management and **EU transport research** for the strategic environmental assessment of transport networks seem to be two areas where important potential overlaps and interactions with the research on territorial impact assessment methods undertaken by ESPON can be found.⁹

The Environment Directorate of DG RTD included in the work programme of FP6 a specific topic on “Strategies for sustainable land management, including coastal zones, agricultural land and forests”, whose global purpose is to develop tools and methods in the field of land use that allow:

- Ex-ante impact assessment of policies at different levels, from micro to macro.
- To identify the contributions of the different sectors and global policies to the EU Sustainable Development Strategy.

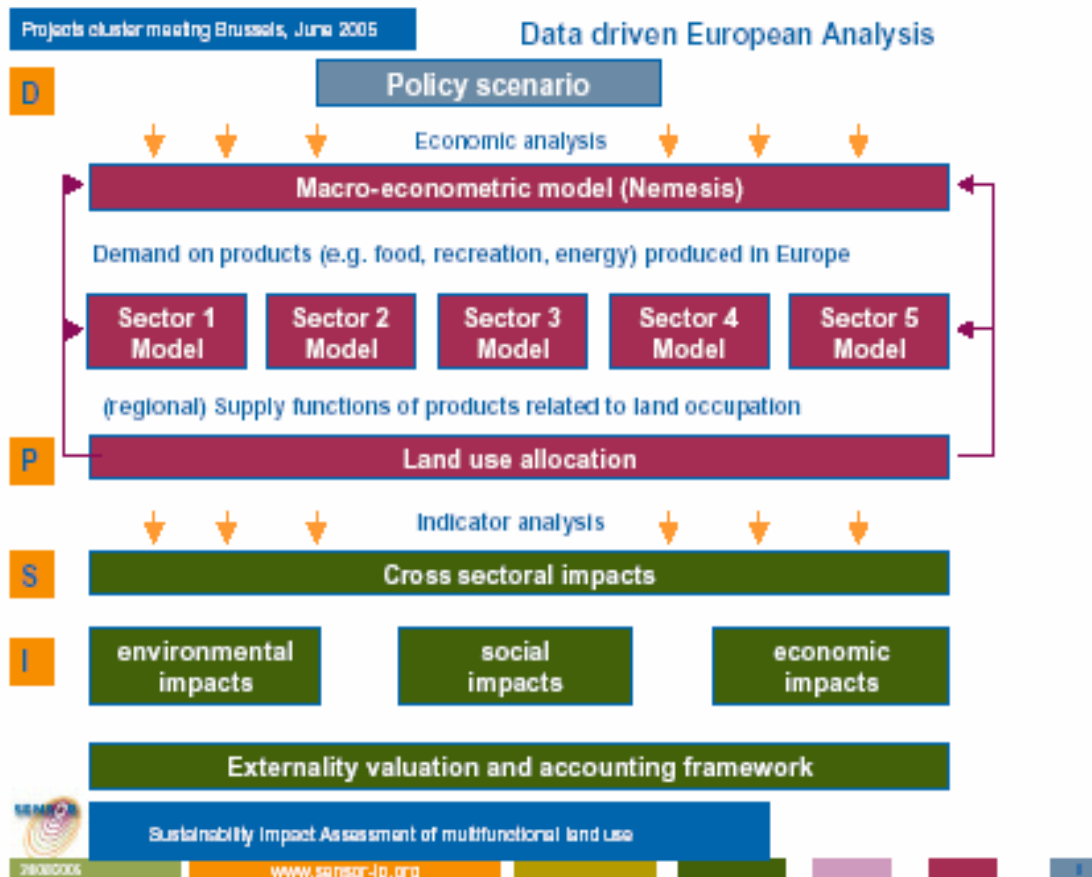
The targeted tools and methods should provide harmonised data systems and services that can be included in the Global Earth Observation System of Systems. The tools should allow carrying out the analysis of EU, national and regional policies in terms of Cost-Benefit, Cost-Efficiency and Scenario Analysis. The tools need to be holistic, considering land use issues

⁹ Within the limits of the present case study it was not possible to investigate other areas of EU research where potential overlaps with ESPON research may be found, although the research on land use management encompasses in practice several sectors of natural and human activities.

from an integrated perspective that takes into consideration the notion of landscape in the broadest meaning: not just the effects on land aesthetics of policy implementation, but also other components associated with landscape such as environmental positive and negative impacts, rural development, social networking, urbanisation, etc.

In this context, the SENSOR project (<http://www.sensor-ip.org/>) covers the development of tools that consider all type of land uses, including post-industrial sites, transportation, urban and rural uses, etc. The scale of coverage is NUTS 2 for the EU25+2+2+1 countries. The objective is to have a tool that takes into consideration the complementarities and the contradictions between land uses at an aggregate level, with an entry point that is macro-economic. Attention is also given to the feasibility of policy options in close interaction with stakeholders. SENSOR will cover the land uses with synthetic response functions for each use by sector. These functions can be replaced by equally synthetic but better defined ones obtained in the other projects. For example, if the project on multifunctional agriculture (SEAMLESS; see below) or the project on multifunctional Forestry and Wood Chains (EFORWOOD; see below) defines land use response functions to policies through a thorough analysis, these functions can/should be adapted to be included in the SENSOR framework.

In this way, SENSOR will provide a methodology and tools for the Sustainability Impact Assessment of **multifunctional land use** in the European policy context, looking at policy scenarios, land use trends, change of indicator values at regional (NUTS 2/3) level and environmental, social and economic impacts in sensitive areas, as illustrated in the slide reproduced below:



It is important to note that SENSOR takes a macro-perspective, using the macro-economic model NEMESIS to analyse sectoral changes due to land use drivers - climate changes, technological developments, global economic changes, demographic changes, land use policies – and how they affect land use allocation and change the indicator values at regional level. The analysis of indicators aims to determine cross-sectoral environmental, social and economic impacts, and these impacts are finally to be evaluated using an externality valuation and accounting framework.

The output of these scenario analysis will be presented on maps of 573 NUTS regions, which are a combination of NUTS2 and NUTS3 regions for EU30 countries.

The SENSOR overall time schedule runs from 2005 up to 2009. During this period other ancillary projects will supply specific inputs to the SENSOR evaluation of multifunctional land uses. In particular, in the field of **multifunctional agriculture**, the SEAMLESS project (<http://www.seamless-ip.org/index.htm>) focuses the analysis at a very detailed level of response, which includes the consideration of optional technologies, and aggregates the stakeholders' behavioural responses up to the EU and international level. These responses are later confronted with EU and international food demands to identify price responses and eventually avoid generating perverse effects that will affect in turn the stakeholders (producers and consumers). The results of this project should be incorporated in the more generic tools that will be generated in SENSOR and vice-versa. Also linkages are expected with EFORWOOD to take into consideration the competition for and complementarities of land use by agriculture and forestry.

Indeed, in the field of **multifunctional forestry/wood chains**, the EFORWOOD project (under negotiation) will deal with the forestry land uses (current and eventual land allocated to forestry as a response to policies), including the management aspects, the industrial use of the wood, considering the direct and indirect impacts on sustainable development, and the demand for forestry and wood products. A strong linkage is expected with SENSOR and SEAMLESS for the reasons mentioned above.

The above research activities are going to be supplemented since 2007 by two new research tasks under the same area of sustainable land management:

- **Urban, peri-urban and rural land use relationships:** the main purpose here is to produce tools that will help in the analysis of the EU urbanising trend in order to identify ways to improve the process and avoid the negative consequences. The spatial consideration of the urban expansion into the peri-urban and how this affects the requests of transportation, food supply chains, environmental and recreation services, and the pressures that these issues will put on the rural land uses need to be understood and represented in the tools. Generic tools for urban, peri-urban planning are expected, based on case studies. The tools should provide the possibility to be easily adapted for the analysis of any urban situation. The level of analysis will need to be at NUTS3 or even more detailed. This new project should be complementary and consistent with the SENSOR project in the sense that it will provide on one hand a thorough analysis of the urban-peri urban-rural linkages, and on the other hand the results can be summarized

and compiled in policy response functions that will be able to be incorporated in SENSOR models and tools.

- **Sustainable Development and Integrated Coastal Zone Management:** This particular case of land use needs to be analysed in detail because all the components are exacerbated at this level and might become one of the principal societal issues in the near future.

As mentioned above, another area of EU research with strong potential links to the ESPON research concerns the development and application of **Strategic Environmental Assessment (SEA)** methods, in particular for the evaluation of transport policies and programmes. SEA methods are the subject of the EU Thematic Network BEACON - Build an Environmental Assessment CONsensus on the Trans-european Transport Network.¹⁰ The project is included in the FP5 Thematic Programme "Sustainable and Competitive Growth", with the objective of establishing an effective platform for the harmonisation of approaches, methodologies, tools and data sets to be used in the Strategic Environmental Assessment (SEA) of transport infrastructure of the Trans-european Network. The project aims at building consensus not only on the general principles of SEA practice, but also on the operational tools and procedures to be adopted for implementation at network, corridor and project levels. Moreover, the enlargement of the European Union calls for swift and effective actions to ensure consistency of infrastructure development and usage across the Continent. BEACON paid therefore particular attention to the implications of a generalised SEA practice for what concerns cross-border assessments.

There are other EU transport research tasks which potentially overlap with research undertaken in ESPON. For instance an EU 6th Research Framework task, under Priority 8 Support to Policies, is now starting aiming to analyse "transport related sensitive areas". The task description is as follows:

"The objective is to research the development of sets of criteria characterising sensitive areas from the point of the view of their sensitiveness to transport activities in the context of EU transport policy. In this respect, sensitiveness should be assessed both regarding nature protection and human health and well-being. At least mountainous and urban areas should be covered and various types of traffic should be equally included in the analysis. The geographical implication of applying sets of criteria for characterising transport related sensitive areas will be explored. The research will provide for the testing of policy instruments in order to assess possible implications of the concept from the EU transport policy point of view. This implies trade-offs between development of transport activities and their impact on economic development, and the objective to preserve sensitive areas will be analysed. A spatially disaggregated valuation of the benefits and costs of transport (including external costs) will be reviewed and used as a starting point to test market-based instruments to mitigate transport impacts."

This research task seems to fit well with the purpose of ESPON research concerning the territorial impacts of transport activities.

¹⁰ www.transport-sea.net

Potential complementarities of ESPON with EU research on sustainable development monitoring and impact assessment

The ESPON research can play an important role both in the **monitoring** and in the **impact assessment** of the sustainable development strategies and policies in Europe.

In relation to the commitment of monitoring sustainable development, ESPON could provide a framework to coordinate the implementation of Sustainable Development Indicators at national and regional level, in order to assure the compatibility with the indicators selected for monitoring the SD strategy at the EU level.

In this way ESPON may become a catalyser of the national and regional spatial strategies and sector policies, ensuring a convergence towards the goals of the EU Sustainable Development agenda. A coordination of any ESPON activity undertaken at this regard with the mentioned EU Research Priority 8 task to assess the interlinkages between different priorities of the Sustainable Development Strategy should be ensured.

In relation to the development of impact assessment methodologies and tools, it is obvious that the efforts to provide a common and coordinated Territorial Impact Assessment (TIA) approach covering the policy areas with important spatial impacts shall be continued. The policy areas addressed so far by ESPON in this respect are:

- Transport and TEN policy
- Research and Development policy
- Common Agriculture policy
- Regional policy

Other sectors, such as the energy and environment sector, employment and social policies, and even cohesion and urban environment policies at the city level should be added in these efforts. Moreover, TIA application is to be considered including not only Community policies but also the corresponding policies at the lower levels (national, regional) implemented by the individual member states.

In any event, an obvious need is to avoid any duplication of efforts between the ESPON research tasks refining the Territorial Impact Assessment and other relevant tools, such as for instance the Macro-economic, Sectoral, Social and Territorial Model (MASST), and the EU research framework tasks currently aiming to develop conceptually similar Sustainability Impact Assessment tools, as for instance the SENSOR project (which includes a macro-economic model with purposes similar to those of the MASST).

A more specific appraisal of possible interactions at the level of single ESPON products is provided in the table below, where the column for "other" research areas possibly related to ESPON could be completed with other relevant EU Research tasks which have not been considered here.

ESPON Products:	Potential complementarities of ESPON products with:		
	EU Research Frameworks projects		
	SIA related projects (SENSOR, etc.)	SEA related projects (BEACON)	Other (Priority 8, other ?)
Territorial cohesion / polycentrism	The ESPON concepts should be taken into account in the Sustainability Impact Assessment methodologies	The ESPON concepts should be taken into account in the Strategic Environmental Assessment methods	
ESPON database/ core indicators			ESPON core indicators may serve to monitor the SD strategy at national and regional level, in accordance with the EU SD strategy monitoring system. The linkage with Priority 8 Task "assessing interlinkages between different priorities of SD" should be promoted.
GIS orientated instruments			
Regional Classification of Europe			
Spatial Analysis Tools			
Territorial Impact Analysis	Cross-fertilisation between the parallel development and application of SIA and TIA methodologies	Cross-fertilisation between the parallel development and application of SEA and TIA methodologies	
MASST	Cross-fertilisation between the parallel development and application of NEMESIS and MASST European models		
KTEN		Application of KTEN to global Strategic Environmental Assessment of TEN policy	Cross-fertilisation between KTEN and DGTREN research projects with similar purposes (ETIS-BASE, TRANSTOOLS)
ETCI	Development and application of the Environmental Territorial Cohesion Index in the SIA/SENSOR exercise		Development and application of the ETCI to the SD monitoring at national and regional

			level. The linkage with the mentioned Priority 9 task should be promoted.
Long-Term database			
Data Navigator			

5. How to exploit ESPON at the regional scale: potential linkages with INTERACT/INTERREG programme

About INTERREG and INTERACT

The Community Initiative **INTERREG** was created in order to promote cross-border, transnational and interregional cooperation. The programme is financed by the European Regional Development Fund (ERDF) and it is based on the creation of partnerships across borders in order to encourage the harmonious and balanced development of the European territory.

INTERREG III, which covers the programming period for 2000 to 2006, is made up of three strands:

- **Strand A** comprises cross-border cooperation between adjacent regions and supports projects in the fields of socio-economic development, planning, culture, infrastructure and related fields. Programmes are mostly set up on a bilateral basis.
- **Strand B** promotes transnational cooperation between national, regional and local authorities with the aim of achieving better integration within the European Union through the formation of large groups of European regions.
- **Strand C** promotes interregional cooperation and aims to improve the effectiveness of regional development policies and instruments through large-scale information exchange, cooperation projects and sharing of experience (networks).

Supplementing the three strands, and with a view to further encouraging the formation of networks that promote the sharing of experiences and best practices, INTERREG III has also provided for the following:

- ESPON itself – the main subject of this study – has been developed according to Art. 53 of the INTERREG Guidelines under a programme financed jointly by the European Union and the 15 Member States, as a network of cooperation between national spatial planning institutes specialised in the observation and analysis of regional development trends in Europe and beyond.
- Cooperation with neighbouring countries, which had already begun through the TACIS, PHARE and MEDA programmes in the previous programming period, and will continue to be developed in INTERREG III.

It is intended that INTERREG III should overcome the obstacles to genuine cooperation that stem from a lack of appropriate structures and procedures, experience, institutional capacity or availability of specific know-how. With the consolidation of its transnational strand the integration of the interregional activities formerly implemented under the innovative actions, the geographic and thematic scope of INTERREG was widened considerably.

Now **INTERACT** is part of the Community Initiative INTERREG. The programme seeks to build on the experience and lessons of INTERREG I and INTERREG II, and to increase the effectiveness of INTERREG III during the current programming period. The core of the INTERACT programme is to set up information and communication networks, to define

information frameworks and flows, to proactively disseminate information and to stimulate exchange of experiences.

Indeed, the implementation of INTERREG III requires specific, transnational know-how which is rarely available at national and regional level. This holds especially true for the transnational and interregional programmes under strands B and C of INTERREG. Although a series of new transnational structures and stakeholders is now emerging, resources devoted to building up this specific know-how are still very limited: INTERACT is designed to meet this demand and to develop and offer decentralised training interventions and workshops for implementing bodies and project leaders aimed at enhancing their management skills.

Potential complementarities of ESPON with INTERACT/ INTERREG

Actually ESPON is an ancillary programme of the INTERREG initiative, aimed to develop studies and data collection, observation and analysis of development trends in support of territorial cooperation activities. In order to outline the future territorial dimension of the EU Regional Policy, the task of the ESPON programme is to find valuable sources of information and data, especially within the transnational geographical spaces of the INTERREG IIIB programmes.

More recently, INTERACT was designed also to achieve, amongst others, the objective of supplying a platform for the transfer of data and information between related initiatives like ESPON, URBACT and the INTERREG programmes in both directions.

The cooperation of ESPON with the INTERREG programmes is therefore a straightforward task under the INTERACT umbrella. In the first phase of the ESPON programme (ESPON I) this cooperation has been substantiated in focusing five thematic studies on issues of special concerns for the on going INTERREG projects. These studies were related to:

- Transportation and communication networks
- Spatial visions and scenarios
- Environmental hazards and risk management
- Polycentric development and urban-rural relations
- Cross-border cooperation

Some interesting conclusions of these studies are:

- The analysis of urban-rural relationships stresses that there is a need for urban-rural and inter-rural cooperation to provide a decent level of services.
- The analysis of cross-border cooperation highlight that on a whole the INTERREG programmes addressed the main regional bottlenecks resulting from the border situation, namely missing infrastructure links, weak economic structures due to limited market and commuting areas as well as institutional and cultural barriers.
- The analysis of the impact of transnational cooperation programmes – undertaken for two INTERREG IIIB regions, namely ARCHIMED and Alpine space – shows that the

budget seems to be too low to reveal significant impacts on transnational level and not only on the smaller regional level.

- An assessment has been done of the question to what degree does INTERREG contribute to the awareness of the idea of polycentric development in Europe, as advocated in the European Spatial Development Perspective. This assessment illustrates the difficulties INTERREG participants have in making truly operational concepts such as polycentric development and in developing genuine trans-national applications. Due to the difficulties of trans-nationality many projects seem finally to focus on the regional level and exchanging experience regarding polycentric development etc. at the regional level.
- A straightforward conclusion from the latter point is that translating ESPON results into information assisting the understanding of polycentricity in trans-national and cross-border situations, on the current state of spatial development and potentials for further co-operation and development, may help a number of INTERREG projects to make use of the ESPON findings for enriching their work. Furthermore, with view on future thematic interregional co-operation programmes focusing on Lisbon and Gothenburg priorities, ideas regarding projects utilising specific potentials for polycentric development or territorial cohesion in various cooperation areas could be suggested, based on existing ESPON studies.
- In the same way as INTERREG projects can benefit from utilising ESPON results, also ESPON may benefit from insights gathered in various INTERREG projects, e.g. in the form of possible case studies for ESPON studies in the field of the conditions for creating functional urban areas and successful networking among actors in related areas.
- Finally, the INTERREG IIIB transnational areas have been designed as gathering contiguous regions which are supposed to share similar specificities or concerns: regions with metropolitan and/or old industry features in North-West Europe, regions with similar mountain traits in the Alpine space, etc. However, recent ESPON research on cross-border, transnational and global flows of population encourage to take into account not only the morphological features but also the functional ones. In other terms, besides the similarity patterns one must not ignore the networking side: flows between cities and between regions. ESPON studies on polycentrism display the image of an increasing integration of urban networks in Europe, with a border that is becoming more open at a transnational scale – due to urban networking through air traffic, university cooperation etc. – than at a local cross-border scale. All this advocates in favour of more systematically taking into account the “space of flows” instead of the geographical contiguity and morphological similarity in forming the transnational regions in which to strengthen the territorial cooperation programmes.

Besides the current findings, future cooperation and complementarity of ESPON with INTERACT may concern:

- Targeted analytical deliveries (new studies).
- Mutual learning at seminars, based on exchanges between ESPON researchers and INTERREG projects holders

- Stimulation of new project ideas coming from specific ESPON studies, both related to future themes for European applied research and to the generation of new INTERREG projects.
- Systematic analysis of thematic interregional cooperation projects results and dissemination for improved regional policy design.

6. How to exploit ESPON at the urban scale: potential linkages with the Urban Audit and the URBACT programme

There are several reasons and opportunities to undertake ESPON research not only at regional scale but also at the urban scale.

Indeed, EU policy interest for urban issues is growing, as demonstrated by two recent documents of the European Commission:

- The Commission Staff Working Paper "Cohesion Policies and cities: the urban contribution to growth and jobs in the regions" published on 23 November 2005
- The EC Communication on Thematic Strategy on the Urban Environment, issued on 11 January 2006.

In addition, there are two EC commission initiatives, the Urban Audit aiming to assess the performance of a consistent sample of European cities against the Lisbon agenda goals and the URBACT programme for networking and exchange of experience on urban regeneration projects, which may benefit from a closer interaction with the ESPON programme.

In the following we will discuss in turn the recent developments of the EU urban policy and the Urban Audit and URBACT programmes, the urban data needs, and the potential linkages of ESPON with the other EU initiatives dealing with urban issues.

The EU urban policy and programmes

The European Council of March 2005 reaffirmed that "Europe must renew the basis of its competitiveness, increase its growth potential and its productivity and strengthen social cohesion, placing the main emphasis on knowledge, innovation and the optimisation of human capital".

In line with this objective, the European Commission has proposed that Cohesion policy should strengthen this strategic approach for the next period, 2007-2013. Special attention is paid in this context to specific needs of certain territories, such as urban and rural areas, with a view to achieving balanced development and removing obstacles to growth. The Cohesion Policy Guidelines¹¹ also promote an integrated approach, delivering not only growth and jobs, but also social and environmental goals.

During an informal meeting in Rotterdam in November 2004, Ministers responsible for urban policy stressed the substantive contribution that Cohesion Policy can make to urban development. Moreover the European Parliament, in its report on the urban dimension in the context of enlargement¹², welcomed the incorporation of **sustainable urban development** into the mainline of Cohesion Policy and the European Structural and Cohesion Funds.

¹¹ Cfr. Communication from the Commission, Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines, 2007-2013, COM(2005)0299, Brussels, 05-07-2005.

¹² EP(2005)0272 Report on the urban dimension in the context of enlargement

In light of the renewed Lisbon strategy for growth and jobs, programmes co-financed through the cohesion policy should seek to target resources on the following three priorities:

- improving the **attractiveness of Member States, regions and cities** by improving accessibility, ensuring adequate quality and level of services, and preserving their environmental potential;
- encouraging **innovation, entrepreneurship** and the growth of the **knowledge economy** by research and innovation capacities, including new information and communication technologies; and
- creating **more and better jobs** by attracting more people into employment or entrepreneurial activity, improving adaptability of workers and enterprises and increasing investment in human capital.

Cities and metropolitan areas are drivers of economic development. They are also key locations for removing obstacles to growth and jobs – notably social exclusion and environmental degradation. So they are privileged places where the challenges of Cohesion Policy must be met. According to the three priorities above we need to make the European cities:

- Attractive places to work and invest
- Innovative and entrepreneurial
- Places where more and better jobs can be found

These are the mainstreams now of the EU Cohesion Policy at the urban level. The mentioned Commission Staff Working Paper describes therefore in detail the issues at stake for making cities attractive, innovative and entrepreneurial, and to solve the current paradox of cities which concentrate many jobs, yet suffer also of high unemployment as compared to “non-urban” or rural environments.

Another important EU urban policy is set out by the Thematic Strategy on the Urban Environment. Indeed, cities are where many environmental problems are concentrated. The environmental challenges facing cities have significant consequences for human health, the quality of life of urban citizens and the economic performance of the cities themselves. The 6th Environment Action Programme (6th EAP) called therefore for the development of a **Thematic Strategy on the Urban Environment** with the objective of *“contributing to a better quality of life through an integrated approach concentrating on urban areas”* and to contribute *“to a high level of quality of life and social well-being for citizens providing an environment where the level of pollution does not give rise to harmful effects on human health and the environment and by encouraging sustainable urban development”*.

Two EC funded urban programmes are relevant here:

- The first is the **Urban Audit** initiative, organised by DGREGIO and EUROSTAT. This is a unique instrument that brings together urban statistics for 258 large and mid-sized cities across 27 European countries. It contains over 200 statistical indicators presenting information on matters such as demography, society, the economy, the environment, transport, the information society and leisure. It contains data for 1991, 1996 and 2001. The analysis of Urban Audit will be further developed and lead to the publication of a full State of European Cities Report, by the end of 2006. One main conclusion from the Urban Audit analyses is that national and global trends are not felt the same way by

different cities. Some cities lead while others lag behind these trends. For example, some cities maintain low unemployment despite a global downturn, while others fail to benefit from a global upswing. As a result, the disparities between cities are far greater than the differences between regions and countries. Analysing cities reveals therefore the biggest challenges to cohesion in Europe.

- The second is the **URBACT** initiative. This is a Community Initiative Programme for the period 2002-2006, which facilitates the networking between cities from all Member States around three larger objectives: i) develop transnational exchanges between URBAN I and URBAN II cities, those cities having benefited from an Urban Pilot Project, and all cities with more than 20.000 inhabitants in the New EU Member States; ii) draw lessons from the analysis of their experiences, policies implemented locally and propose innovative approaches to those difficult issues; iii) disseminate towards the actors in all European cities the experiences in those different areas, the lessons learned and the resulting proposals for problems solving. The efforts of URBACT concern therefore mainly the cities and those areas which are characterised by a raised level of unemployment, of delinquency and poverty and by the insufficient presence of public services.

The philosophy behind the EU intervention at the urban level, being through the Urban Audit assessment and benchmarking of cities' performance or by means of URBACT knowledge dissemination and learning experience, is that the urban environment needs action at all levels – EU, national and regional – because many solutions already exist in certain cities but are not sufficiently disseminated or implemented. The EU can best support Member States and local authorities by promoting Europe's best practices, facilitating their widespread use throughout Europe and encouraging effective networking and exchange of experiences between cities. It can offer financial support for investments to meet environmental and social priorities and support capacity building by making funds available for research and training, be developing relevant guidance and encouraging the establishment of national advisory points for cities.

Urban data needs

At the European level, while there are many indicators in use in different cities and towns, they are in general only sporadically implemented, do not provide comparable data, or are not suited to the multiple ambitions of the EU urban policy. Similarly, the data gathered in the framework of sectoral actions, such as climate change or water, are rarely analysed separately at the urban level, with the notable exception of urban air quality.

There are several actors involved, including the European Commission, EEA, EUROSTAT, JRC, the Member States, national statistical institutes and the cities themselves. There is some overlapping in what they are doing, for instance both EEA and EUROSTAT gather data on air quality but in different contexts, and overall there is lack of consistent, coherent, complete and comparable urban economic, social and environmental data.

This happens also where a special effort of harmonisation of urban data has been produced, as for the 258 cities of the Urban Audit exercise. Actually this exercise has demonstrated that the compilation of urban statistics on a European scale is not without its problems.

Based on the individual interpretation that any one country gives to the different indicators, the collected data may sometimes be difficult to compare (e.g. there are significant differences in the way urban crime rates are defined from one country to another).

The objective therefore is to establish a coordinated and sufficient flow of data on the urban environment from towns and cities, encompassing the economic, social and environmental dimensions, through the Member States to the European Institutions to provide European level statistical data on the urban environment, economic and social situation. This would be done making the best use of existing data flows, seeking to minimise the extra burden on Member States and cities. It would involve identifying what is needed to inform policy makers and the citizens, reviewing what is collected, identifying the gaps and inefficiencies, and setting in place a strategy and a plan of actions to ensure that sufficient, comparable and appropriate data is collected and circulates efficiently.

Some EU level actions aimed to realise this objective are worth of mention:

- First and foremost, the **INSPIRE** initiative described in chapter 3 above. In the context of this initiative to build up an infrastructure for spatial information in Europe, it is suggested that a definition of “urban area” should be ready for 2007. Categories of urban data that are already being addressed in the INSPIRE framework include transport networks, buildings, land cover, biodiversity, soil, area management, environmental monitoring facilities, water bodies and catchment.
- Second, the **EEA State of the Urban Environment report**: the EEA will begin to split more systematically the data it receives into urban and non-urban, and prepare a first report in 2005 as part of its overall reporting activities. It is likely that this first report will only cover a part of the range of issues that should in the longer term be covered, which will focus on key urban environment issues: air, noise, waste, water, energy, climate change, nature, biodiversity, soil.¹³ Currently the EEA State of the Environment reports include a lot of environmental indicators, but little is analysed specifically on an urban basis.
- Third, the **Working group on urban environment data needs**: this multi-stakeholder group, involving all key actors (JRC, EEA, EUROSTAT, DG ENV, cities and other stakeholders) will clarify what data is needed to monitor and guide the Thematic Strategy on Urban Environment as well as to assist national and local decision makers, review the existing urban environment data collection, and identify the gaps. It will develop a short and longer term strategy to establish a flow of sufficient and harmonised urban environment data (both vertical and horizontal, through the various administrative bodies), and propose an action plan to put into practice.¹⁴
- Fourth, the **European Common Indicators (ECI)** project: at the local level, the Commission has provided an “off the shelf” set of urban environment indicators that can be used by towns and cities on a voluntary basis (currently are used by 148

¹³ the information on the state of play of this EEA report needs to be updated.

¹⁴ the information on the state of play of this Working group needs to be updated.

municipalities). The ECI¹⁵ were developed by the EU Expert Group on the Urban Environment and are particularly useful for local authorities just starting to tackle environmental issues for their urban area as a whole. They cover citizen satisfaction, contribution to climate change, mobility and passenger transportation, availability of local public open areas and services, quality of local ambient air, journeys by children to and from school, sustainable management of the local authority and local business, noise, sustainable land use, products promoting sustainability, ecological footprint.

Potential complementarities of ESPON with other EU urban programmes

Provided that the various initiatives in place to improve the availability and harmonisation of urban data will continue successfully, it is clear the increasing demand for ESPON studies at the urban level.

Indeed, the Urban Audit analysis undertaken so far already stressed interesting correlations between the cities' performance and other aspects investigated by ESPON:

- At the **global European scale**, there is a clear linkage between city accessibility and economic performance. The multimodal accessibility map produced by ESPON clearly shows a polycentric pattern with more distant capitals and large cities providing fairly good accessibility. Comparing multimodal and air accessibility of cities to the city GDP per capita, as it has been done in the Urban Audit study, shows that both are extremely closely linked, which underlines the growing importance of air connections for European cities.

- At the **local metropolitan scale**, cities are centres of employment, leisure, culture and retail, which attract many people and a substantial amount of traffic. Commuting to work generates a large share of this traffic. The Urban Audit shows that, on average, one out of every three jobs in cities goes to someone living outside of the city, and the trend towards urban sprawl is increasing. In twenty cities, over half of the jobs go to commuters. Urban sprawl is usually accompanied by a large increase in car ownership and a corresponding drop in the use of public transport, especially in the new Member States, with harmful effects on congestion and the urban environment. The Urban Audit, however, shows that a high level of car ownership does not have to correspond with a high share of car trips: cities in the Nordic countries have been very successful in encouraging different forms of transport and discouraging people from driving into the city centre. The lesson to be drawn is that when public transport offers an attractive travel option and there are incentives not to drive, many urban residents are prepared to leave their cars at home.

There is clearly the need to learn further and more scientifically validated lessons about the evolution of the European cities and the global and local factors which influence their perspectives of success or failure. This is the area where a new stream of ESPON urban studies might focus, in close coordination with the Urban Audit and other EU Research

¹⁵ www.sustainable-cities.org/indicators/index.htm

activities on urban matters which are to be envisaged in the forthcoming 7th Framework Programme.

Strengthening the link between ESPON and URBACT will finally help to disseminate the results of these ESPON urban studies to a wider arena of city policy makers and stakeholders.