ESPON project 3.2
Spatial Scenarios and Orientations in relation to the ESDP and Cohesion Policy

Final Report
October 2006

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Volume 5
Territorial Impact Assessment

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Executive Summary

Introduction

The ESPON programme has come a long ways in exploring the territorial aspects of European developments and policies. It has, thus, accumulated great amounts of knowledge which, aside from the scientific advances, should offer policy makers a greater pool of information on which to base their decisions. Some efforts have been made to synthesise this information in a more understandable and concrete way (see project 2.4.2, for example, and, obviously, the work on scenarios in project 3.2). However, there still is a need for further operationalisation of this knowledge in order to allow its usage in the day-to-day context of policy making.

One of the tools high on the wish list of territorial policy makers is a tool which should allow non-specialists to organise their thinking about the territorial impacts of particular policy choices and programmes. This tool should offer the necessary framework for decision makers, and stakeholders in general, to help them explore the impacts of any policy on different spatial levels in order to allow informed debate and decision-making processes.

In reference to non-territorialized assessments of the same kind, this type of tool has been baptised **T**erritorial **I**mpact **A**ssessment (or TIA). Since the beginning of the programme, ESPON has attempted to shed some light on what TIA means and what it could look like in practical terms. TIA has been covered by all the priority 2 projects of the programme and some others. Most of the work has been about ex-post assessment of different sectoral policies, but some first attempts at ex-ante assessments also exist.

This report presents the findings of ESPON project 3.2 on TIA. It is divided into two parts, one more theoretical, the other containing a practical proposal.

The first part begins by exploring the historical evolution of the notion of territorial impact assessment in the European policy context. It then summarises in detail the approaches used by different ESPON projects. A section on the major cause and effect relationships by thematic field closes this more theoretical section.

In the practical part, we present the prototype and first implementation of a methodology for future assessments, called TEQUILA and developed by the team from the Politecnico de Milano, under the leadership of Roberto Camagni. TEQUILA is a multicriteria model which breaks down the impact assessment into a general part exploring impacts of policies on policy-related indicators on a general level and a regionalised part where these general impacts are then adapted to regional specificities.

Caveat lector – about combining science and policy making in one tool

The interface between scientific research and evidence and policy making is a difficult one. Science is often incapable of giving clear answers to important questions as evidence is shaky and results can be interpreted in different ways. Policy making is often incapable of using scientific results as it operates within many other constraints then just those imposed by the limits of scientific knowledge. Policy will never be scientific as it is not about searching for the 'truth', but essentially about synthesising power struggles. Science will never be policy as it is not about taking decisions, but about asking questions.

Territorial impact assessment as discussed in this report is about finding a compromise between the two worlds by offering policy makers a tool which is useful in their daily work but which at the same time results out of scientific knowledge. It has to allow the integration of power struggles and conflicts of interest while maintaining a certain solidity based on 'reality' as defined by scientific knowledge.

By definition, impact assessment of policies, especially of territorial policies, cannot be scientific in the positivist sense because of a lack of control groups and because results are not contestable. It is impossible to find exactly identical regions with exactly the same driving forces at work within them and to then apply a policy on some of these and not on the others in order to see the difference made by the policy. Territorial development is too complex for identical regions to exist, and policy making does not allow for laboratory-type experimentation. This is true for ex-post assessments, and *a fortiori* for ex-ante approaches.

An important consequence of this is that assertions about specific impacts of specific policies cannot be falsified. Just as much as one cannot prove the actual cause and effect relationship between a policy and the evolutions in the territory this policy was applied upon (because of the lack of control groups), one cannot disprove claims about such effects. This makes impact assessment a highly political and - to a certain extent – politicized tool.

Any approach to impact assessment in general, and to territorial impact assessment in particular, therefore has to take this fundamental short-coming into account and has to make as explicit as possible the political aspects of the process.

The history of (territorial) impact assessment

Since the beginning of the 1980s the issue of (in)coherence between different European sectoral policies and the (regionalised) cohesion goals was raised. Within the European policy context, policy impacts studies carried out are generally ex-post studies, although a number of future-oriented assertions of ex-ante type are also formulated.

The existing formalised tools such as the Environmental Impact Assessment and the Strategic Environmental Assessment only concern programmes and projects, not policies, and are limited to the field of environmental sustainability.

Recently, the Commission has also developed the general Impact Assessment procedure which aims at evaluating the impacts of different forms of policy implementation. Up to now, territorial impacts have not been taken into account.

The ESDP explicitly mentions the need for specific *territorial* impact assessment procedures, at least for concrete projects, but also calls for the need to coordinate the sectoral policies with territorial goals. In line with the ESDP proposals, the ESPON has tried to measure the territorial impact of a whole series of sectoral policies.

Presently, the territorial impact assessment of EU (and other) policies is generally conceived with regard to the objective of territorial cohesion, although the European Constitution has not been ratified. The need to provide the concept of territorial cohesion with a more precise definition remains however on the agenda.

TIA in ESPON

The eleven ESPON policy impact studies examined in this report show a rather strong diversity in the approaches adopted. This diversity reflects the heterogeneity of the policies themselves which influence the evolution of the territory through the application of rather different instruments and measures. Diversity is however stronger in the field of techniques of analysis than in that of types of impacts investigated or in that of logic and formalisation of cause-impact relations. Only a few policy impact studies are future-oriented and produce substantial simulations of possible territorial impacts of future policies.

Causality relations

The search of univocal causality relations in territorial development related to public policies is a difficult exercise because numerous factors, in addition to policies, generally interfere. It is however possible to deduct from theories a number of possible explanations of the territorial evolution empirically observed. This exercise has been made for four EU policies: CAP and RDP, macro-economic policies, R&D policies and Transport Policy.

TEQUILA

This project has provided an important step towards a futher operationalistion of the concept of territorial impact assessment. The experience of the different ESPON impact analysis studies, as well as an analysis of the major territorial policy documents led to the development of a flexible TIA-model allowing the integration of different policies, different means of impact measurements, and, very importantly changing policy goals and priorities.

TEQUILA for the impatient – The scientific definition

- TEQUILA is a Multicriteria Model; given the multiplicity of the 'dimensions' of territory, this well-known assessment approach seems the most appropriate.

- As for any impact assessment, it has to be decided what to assess against. This is obviously a political choice, but whatever this choice is, a general policy goal has to be broken up by more concrete dimensions which allow at least a qualitative assessment. In our case, we have chosen *Territorial Cohesion* as the policy objective, broken up into the three dimensions of territorial *efficiency*, *quality* and *identity*, each of which is in turn represented by a series of sub-components. Each of these sub-components is assessed separately before summing up the three dimensions.

- The TEQUILA model first furnishes a *General Assessment* (GA) of the impact of EU policies on the overall European territory (1st layer). This assessment refers to a general, abstract territory, and the impact on each criterion (c) may be seen as a 'potential impact' (PIM):

$GA = \Sigma c\ \theta c\ .\ PIMc$

where

θc = weight of the c criterion
PIM = potential impact of policy (abstract)

- For each criterion a choice has to be made of how to scale the quantitative or qualitative impact measurements.

- The preceding 'general' assessment must be made truly 'territorial' by considering the specificities of the single European regions, given that:

- the *impact* may differ according to regional specificities
- the *intensity* of the policy application may be different in different regions
- the *relevance* of the different 'criteria' of the assessment method is likely to be different for different regions (e.g.: the same increase in income has a different significance according to the development level already achieved by an individual region)
- a region may not be subject to a specific policy.

- In a second step a *Territorial Impact* model is built to assess the impact on single regions r (2nd layer). It is designed to be simple, operational and relatively user-friendly. The rationale for the following equation is the following: as in risk assessment, where *risk* = *hazard* (potential risk) x *vulnerability*, here the territorial impact is the product of a *potential impact* (PIM) times a *sensitivity* indicator.

  $TIM_r = \Sigma_c \theta_c \cdot S_{r,c} \cdot (PIM_c \cdot PI_r) \cdot Par$

  TIM = territorial impact (for each dimension : efficiency, quality, identity)
  c = criterion of the multi-criteria method
  r = region
  θ_c = weight of the c criterion, $0 \leq \theta_c \leq 1$; $\Sigma_c \theta_c = 1$
  $S_{r,c}$ = sensitivity of region r to criterion c, $0 \leq S_{r,c} \leq 1$
  PIM = potential impact of policy (abstract), $-5 \leq PIM_c \leq +5$ (in qualitative analyses)
  PI = policy intensity (in region r)
  PA = policy applicability (a 0/1 variable)

TEQUILA for the impatient – A concrete example of operation

- Identify the policy to be assessed. This has to be sufficiently concrete to allow a real assessment. If the policy is abstract, it has to be broken down into more concrete policy packages which can then be assessed separately.
- Identify the policy goals against which to assess. Again, even though the goals might be abstract (such as territorial cohesion), they have to be broken down into more operational dimensions. At the end, it should be possible to define at least a theoretical cause and effect relationship between each of the sub-components of the policy goals and each of the concrete policy packages.
- Quantify the general policy impact, i.e. either through existing studies, delphi exercises, expert panels, or other methods, come up with an evaluation on a scale of -5 - +5 of the impact of each of the concrete policy packages on each of the sub-components of the policy goals. You might want to limit some of the impacts to only parts of this scale (e.g. 1-3 if there are no possible negative impacts, but no very strong positive impacts either, or -1 - +1) if the actual differences are not that

large. This latter step has to be done subjectively and should also be very transparent.

- Define the weight of each policy goal. This is a very political process and should be as transparent as possible.
- Apply the above formula to calculate the GA already giving a general idea of the generalised impact across the entire territory.
- For each subcomponent of the policy goals, a regional sensitivity indicator has to be provided, i.e. a quantitative estimate of how much a region is affected by the specific general evolution of a sub-component. This estimate can, again, be the result of existing regionalised studies, or of more general estimates by experts or stakeholders. For example, if a certain concrete policy will lead to a general increase in GDP, a poor region might be affected differently than a rich region. Thus the sensitivity indicator for the sub-component 'Increase of GDP' might give a value inversely proportional to the regional GDP value, or some more complex ('utility') function.
- Apply the second of the above formulas to calculate the TIM, i.e. the regional impact.

Territorial Impact Assessment

1 Introduction

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2 Territorial impact assessment in historical perspective

Search of coherence between EU policies after the creation of the ERDF

The ERDF was created in 1975 as a follow up of the EU enlargement of 1973 (UK, Ireland, Denmark). A few years after the beginning of the implementation of EU regional policy on the basis of ERDF resources, voices were heard in political and administrative circles raising the issue of incoherencies between the regional impacts of the EU regional policy and those of other EU policies (CAP, research, transport, etc.). In order to determine in how far these policies were counteracting or supporting the regional policy, the Directorate General of Regional Policy of the European Commission commissioned a series of investigations in the early 1980s. The main principle of these investigations was to compare ex-post the allocation of credits from the various policies to the European regions with the level of economic development (GDP/inh) of the regions. More sophisticated approaches based for instance on multiplier and induction effects of public subsidies on the general economy were not applied. A major result of these investigations was that the Common Agricultural Policy (largely based at that time on market support mechanisms) was the most detrimental to socio-economic cohesion, because the largest part of CAP support was allocated to rich and fertile regions. In practical terms, the issue of regional incoherence of EU policies was raised and some form of awareness raising was reached, but no specific reform was carried out on that basis. In the particular case of the CAP, the reforms of the 1980s addressed the issues of agricultural overproduction and introduced various instruments, such as the quotas systems, which were targeting global objectives of market regulation and limitation of public budgets without specific consideration of territorial balance.

Impacts of the evolution of the Treaty of the European Community

During the late 1980s and early 1990s, the Treaty of the European Community was modified several times (Single Act, Maastricht Treaty), resulting in the introduction of general thematic objectives which had to be respected by all EU policies. These are the objectives of economic and social cohesion and the objective of environmental protection (which became later on the objective of sustainable development). The new legal framework generated a number of scientific investigations and of innovative practices.

a) Regional policy impacts against the cohesion objective

The three Cohesion Reports published up to now by the European Commission contain the summaries and key messages of various studies commissioned by the European Commission on regional and territorial impacts of different EU policies.

It is hardly possible to provide a concise but substantial overview of the approaches and outcomes of all studies carried out in the context of the preparation of the Cohesion Reports. A brief summary will be provided hereafter of the topics tackled by the second and the third Cohesion Reports, together with a few comments on the various approaches adopted.

The objective against which the various policies are assessed is the cohesion objective. The policy impacts studies carried out are generally ex-post studies, although a number of future-oriented assertions of ex-ante type (what is likely to happen in terms of regional impacts) are also formulated. The Second Cohesion Report concentrates on the following EU policies: Economic and Monetary Union, Single Market, Competition, CAP (prices and markets), Employment and Human Resources, Environment, Research and Development, Transport, Energy, Enterprises, Fishery. The Third Cohesion Report investigates the territorial impacts of other EU policies or strategies (Justice and Internal Affairs, Lisbon/Göteborg Strategy), of the reforms of certain policies (CAP, Fishery). It also concentrates on the impacts on cohesion of public policies carried out by member states (public expenditures, fiscal policies, regional policies). In terms of approaches, some of the studies use rather sophisticated instruments (integrated models), while others are more simple statistical analyses (for instance of capital flow distribution). In both Cohesion Reports, a great deal of attention is paid to the potential impacts of EU policies on new member/accession countries.

b) Impacts of projects, plans and programmes against the objective of environmental protection and sustainable development

The EIA Directive on Environmental Impact Assessment of the effects of projects on the environment was introduced in 1985 and was amended in 1997. The EIA procedure ensures that environmental consequences of projects are identified and assessed before authorisation is given. The public can give its opinion and all results are taken into account in the authorisation procedure of the project. The public is informed of the decision afterwards. The EIA Directive outlines which project categories shall be made subject to an EIA, which procedure shall be followed and the content of the assessment. Following the signature of the Aarhus Convention by the Community on 25 June 1998, the Community adopted in May 2003 Directive 2003/35/EC amending amongst others the EIA Directive. This Directive intends to align the provisions on public participation in accordance with the Aarhus Convention on public participation in decision-making and access to justice in environmental matters.
The purpose of the SEA-Directive (adopted in 2001) is to ensure that environmental consequences of certain plans and programmes are identified and assessed during their preparation and before their adoption. The public and environmental authorities can give their opinion and all results are integrated and taken into account in the course of the planning procedure. After the adoption of the plan or programme the public is informed about the decision and the way in which it was made. In the case of likely transboundary significant effects the affected Member State and its public are informed and have the possibility to make comments which are also integrated into the national decision making process. SEA contributes to more transparent planning by involving the public and by integrating environmental considerations. This will help to achieve the goal of sustainable development.
In terms of approaches, EIA and SEA are ex-ante procedures. They are mainly of qualitative nature and concentrate on all aspects related to environmental protection on a thematic approach (water, air, soil etc.) in relation with EU regulations.

c) General impact assessment of EU policies

Already the 'White paper on governance of the European Commission' (2001) mentioned to improve overall policy coherence and advocated a new impact assessment method:

'The **new impact assessment method** integrates all sectoral assessments concerning direct and indirect impacts of a proposed measure into one global instrument, hence moving away from the existing situation of a number of partial and sectoral assessments. 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, small and medium enterprises assessment, trade impact assessment, regulatory impact assessment etc. Indeed, the new integrated Impact Assessment tool builds on these existing practices and incorporates them into the new tool. It is clear that the scope and methodology of impact assessment will vary

according to the negotiating guidelines for international agreements and white papers will require an adjustment of the approach used for impact assessment of regulatory initiatives.' [1]

The White Paper stressed also: 'the territorial impact of EU policies in areas such as transport, energy, or environment should be addressed. These policies should form part of a coherent whole as stated in the EU's second cohesion report; there is a need to avoid a logic which is too sector-specific.'

The Göteborg European Council in June 2001 and the Laeken European Council in December 2001 introduced two important political considerations:

- First, to consider the effects of policy proposals in their economic, social and environmental dimensions.
- Second, to simplify and improve the regulatory environment.

A procedure of general impact assessment of EU policies was set up on the basis of these decisions.

The aims of the impact assessment process are to improve the quality of Commission proposals and to improve and simplify the regulatory environment. It should also help ensure consistency between Community policies and contribute to sustainable development by assessing the economic, environmental and social impacts of policy proposals. It should lead to proposals that not only tackle the problem they aim to solve but also take into account side effects on other policy areas.

Impact assessment (IA) is a process aimed at structuring and supporting the development of policies. It identifies and assesses the problem at stake and the objectives pursued. It identifies the main options for achieving the objective and analyses their likely impacts in the economic, environmental and social fields. It outlines advantages and disadvantages of each option and examines possible synergies and trade-offs.

Thorough consultation of different stakeholders and coordination between the different Commission services are key elements of this process.

Impact assessment is applied to major Commission proposals, i.e. those listed in its Annual Policy Strategy or its Work Programme, be they

- regulatory proposals;
- other proposals having considerable economic, social and environmental impacts;
- proposals having a major impact on particular groups;
- proposals representing a major change or policy reform. The latter include proposals such as white papers, expenditure programmes, communications on policy orientations and negotiating guidelines for international agreements.

The impacts of policies are basically analyzed in a three step procedure:

- Step 1 – Identification of environmental, social and economical impacts

1 CEC (2001) European Governance; White Paper, Brussels, 25-7-2001, COM(2001) 428 def. Luxembourg: Office for Official publications of the European Commission

- Step 2 - Qualitative assessment of which impacts are the most significant
- Step 3 – Advanced qualitative and/or quantitative analysis of impacts

Thus this involves answering a number of basic analytical questions:

- What are the nature, magnitude and evolution of the problem?
- What should be the objectives pursued by the Union?
- What are the main policy options for reaching these objectives?
- What are the likely economic, social and environmental impacts of these options?
- What are the advantages and disadvantages of the main options?
- How could future monitoring and evaluation be organized?

The analysis of the economic, social and environmental impacts is a crucial element of the impact assessment process and a prediction of likely consequences (intended and unintended) of each (policy) option is defined in the previous step of the process. The information must be made clear on the impacts of the various policy options as it is then used as a basis for their comparison against each other and against a 'no policy change' option.

After the IA has been completed, its findings are taken into consideration by The College of the Commissioners, though importantly the IA does not *dictate* the contents of their final decision. Once implemented the policy option is being monitored and evaluated according to the IA to verify whether the extent to which the policy is achieving its set objectives.
In terms of approach and tools, a specific, Internet-based software (IQ Tools) has been developed, designed to support desk officers to assess the potential impacts intended and unintended, of policy initiatives on the economic, environmental and social dimensions of sustainability and the significance of those impacts. The IA of EU policies is an ex-ante approach, mainly of qualitative nature.

d) Recommendations of the ESDP and follow-up

The ESDP was adopted in 1999 in Potsdam. It addressed TIA at several territorial contexts and recommended application as an instrument for spatial assessment of large infrastructure projects (Option 29), coastal areas, mountain areas and wetlands ... (Option 42), water management projects (Option 52), cross-border TIAs (rec. after para 178), and in particular the use of cross-border territorial impact assessments (rec. after para. 1786).
These recommendations concerned applications of TIA at project level, including the cross-border and transnational dimension. A second category of recommendations are made at policy level.

In section 4.2 dedicated to the application of the ESDP at Community level, following recommendations are made: 'It is proposed that the European Commission examine periodically and systematically the spatial effects of policies, such as Common Agricultural

Policy, Transport Policy and Trans-European Networks, Structural Policy, environmental Policy, competition Policy and Research and Technology Policy, at European level'. At the following informal meeting of Ministers responsible for Spatial Development Policies (Tampere, November 1999), the concept of Territorial Impact Assessment of EU policies was introduced into the ESDP Action Programme.
In the course of implementing this programme the UK delegation had taken responsibility for the topic and organised a **Conference on Territorial Impact Assessment** in late October of 2001 in Louvain-la-Neuve (Belgium). Main results were[2]:

(1) An overview on the variety of features and applications of relevant assessment procedures at local, regional and national level. In particular, the close relationship to the Environmental Impact Assessment (EIA) and the Strategic Environmental Assessment (SEA) was revealed. As one first step for implementation of the ESDP recommendations mentioned above a specific application of TIA to transnational projects under the term Transnational Territorial Impact Analysis (without a new legal regulation, neither at the European nor at the national level) was also suggested.

(2) Concerning the future application at the European level, the analysis of the different practices using TIA so far was concluded as follows:

- Implicitly the ESDP uses TIA as a tool for assessing the impact of projects but there is no reason why suitable approaches should not be developed for assessing the impact of plans and programmes and even, potentially, policies – such as the impacts arising from the accession process

- Current techniques are not sufficient to meet the challenge presented by the desire to consider the spatial implications of different policy interactions;

- Any discussion of TIA should differentiate between the TIA of projects and TIA of plans 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 consider extending the existing procedures to cover social and economic impacts;

- A common framework ... may 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. Sustainability Assessment would be explicitly considered as a planning and management tool.

[2] See ESPON Project 3.1, Final Report, pp. 428-430.

- This might be taken forward through EU regulation but it would be simpler to extend existing good practice and develop more robust approaches through partnership and co-operation. One mechanism for this could be, for example, through the INTERREG III B Community initiative

(3) Another main input – which obviously is closest to the topical context here – was given at that conference with special reference to the **ESPON programme**. An outlook to the programme showed where different measures refer to 'TIA' and drew attention to the different

Simultaneously, the European Commission had commissioned a study on 'Spatial impacts of Community policies and costs of non-coordination' which delivered a number of messages:

I. The territorial impacts of community policies are diverse in nature, heterogeneous and changing over time. There are various ways of intervention of Community Policies on the territory:

- Financial resource distribution from the Community budget. The territorial impacts are different according to whether this involves:
  - supports to incomes (price guarantees, market policies in agriculture), which influence regional GDP, purchasing power in rural areas and also contribute to fix agricultural population;
  - regionalised structural measures, on the basis of economic and social cohesion objectives. The rules of programming under Community responsibility – which influence the size of the geographical areas eligible to structural interventions as well as the criteria for geographic and thematic concentration of financial resources – are not neutral in terms of territorial impact;
  - horizontal structural measures (orientation measures designed to improve agricultural structures, employment and human resource development measures involving the current Objectives 3 and 4 of structural policies), whose territorial impact depends at the same time upon the contents of the programmes drawn up by regional and national authorities and upon the local initiatives benefiting from these programmes;
  - sectoral policies, such as the financing of research programmes and initiatives of a cultural, touristic, environmental, energetic or technological nature or relating to education and training. The territorial impact of these sectoral policies is largely tributary to the location of the initiatives that get the funding. In general, the most developed regions are those which have the most dynamic socio-economic actors;

- The provisions of the Treaty, as well as detailed legislation and regulations (e.g. competition rules, market liberalisation, environmental legislation, market-based instruments). These affect the structural context for action, both of public authorities in Member states and of economic and social actors as a whole;

- The development of guidelines. This involves mainly the Trans-European transport and energy networks, which provide a long-term perspective. Associated with the financing instruments, they play a critical role in the spatial-economic development.

II. Issues related to the territorial impacts of EU policies do not concern only the EU level. National governments play an important part in the conception and approval (Councils of Ministers) of EU policies and even more in their implementation. In a number of countries, regional authorities are also significantly involved in the implementation process. The search of better territorial coherence of EU policies has therefore to involve also the national and regional stakeholders.

III. The regional structural policy is somewhat paradoxical, as it is conceived (in various Cohesion countries) on a sectoral basis, largely ignoring the territorial dimension.
When EU policies are assessed against the objectives promoted by the ESDP, most frequently the objective of polycentricity is taken into account, while the numerous policy options of the ESDP are generally less intensively considered.

e) Territorial impacts of EU policies against the objective of territorial cohesion

The concept of territorial cohesion was mentioned in the ESDP, but rather marginally as it had no legal basis. Territorial cohesion became an important concept in the preparation of the European Constitution. In the final text (not yet ratified), territorial cohesion has the same rank as economic and social cohesion in terms of fundamental objectives of the European Union. The text of the constitution does not provide, however, any definition of 'territorial cohesion'. Various institutions have been attempting to provide a definition and content to the concept of territorial cohesion. The European Commission indicated in its Third Cohesion Report that 'the concept of territorial cohesion extends beyond the notion of economic and social cohesion by both adding to this and reinforcing it. In policy terms, the objective is to help achieve a more balanced development by reducing existing disparities, avoiding territorial imbalances and by making both sectoral policies which have a spatial impact and regional policy more coherent. The concern is also to improve territorial integration and encourage cooperation between regions'.

At the end of 2004, the Dutch Presidency of the European Union organized, in the context of the enlarged Union, a new Conference of Ministers responsible for territorial development. In its report presented to the other 24 country ministers (Rotterdam document), the Dutch Presidency defined territorial cohesion as follows: it is possible to distinguish three distinct but related dimensions of territorial cohesion, a regional/national dimension, a transnational and interregional dimension and a governance dimension:

- Regional/national dimension: activation of regional potentials, accessibility;

- Transnational and interregional dimension: Territorial integration, identification of possible alternative 'global integration areas';

- Governance dimension: territorial cohesion is a multi-sectoral and a multi-level concept that can be implemented at regional/national, transnational and European levels.

Presently, the territorial impact assessment of EU (and other) policies is generally conceived with regard to the objective of territorial cohesion, although the European Constitution has not been ratified. The need to provide the concept of territorial cohesion with a more precise definition remains however on the agenda.

3 Approaches adopted in policy impact studies in the context of the ESPON Projects

A number of ESPON studies are policy impact studies. They were therefore confronted with the requirements of the T.I.A. Various approaches were developed in this respect, on the background of the minimum requirements stipulated by ESPON Project 3.1. which are as follows:

Scoping

1. Reference to policy interventions
Designation of the causing interventions assignable to EU budget lines
Question to be answered: What is causing the impacts?

2. Hypothesis on cause-effect-relations
Basis: hypothesis concerning cause-effect-relations (with varying empirical proof)
Question to be answered: What is changed by the intervention(s)?

3. Regional scale of observation
Designation of geographic reference to be used: regions concerned by intervention/effect; territorial level(s) of observation; covering all or selected (by what criteria) regions cause-effect relations
Question to be answered: Level of observation and analysis?

4. Reference to past and future
Cause-effect relations in the past as the basis for predicting the effects of future interventions; empirical experiences as well as outlooks to the future crucial for analytic treatment and political perception
Questions to be answered: What has happened, what may happen in future?

Analysing

5. Interventions and effects measured
Implementation of the hypothesis concerning cause-effect-relations
Question to be answered: What is registered, measured, appraised?

6. Quantitative/qualitative appraisal
Designation of type of indicators selected
Question to be answered: By what kind of indicators the topic is described?

7. Technique of analysis
Designation of type of analysis used

Question to be answered: How is the analysis performed?

Assessing

8. Goals referred to
Designation of criteria for evaluation derived from the two ESPON key concepts focusing on the spatial dimension

- Polycentric spatial development
  - at European level: several metropolitan regions as global integration zones instead of only one
  - at transnational level: enforcement of a polycentric system of metropolitan regions, city clusters and city networks
  - at national level: systems of cities including the corresponding rural areas and towns open for application at lower levels, e.g. for the development within city regions (intraregional)
  - (polycentric development at one level does not necessarily go along with the same at the other levels)
- Cohesion
  - Economic: balanced territorial development concerning economic performance
  - Social: balanced territorial development concerning employment, income, education, population change
  - Territorial: fair access for citizens and economic operators to services of general economic interest; balanced distribution of human activities

Other goals derived from official documents may also be taken into account if they are related to types of regions or particular spatial entities mentioned below (9)
Question to be answered: What goals are referred to?

9. Applied meaning of 'spatial/territorial'
Designation of the concept of 'spatial/territorial' used according to the policy area concerned
Question to be answered: What concept of 'spatial/territorial' applied?

10. Territorial coverage of outcome
Designation of the general format of results covering the whole territory (referring to each region) or a selected sample of regions (case studies)
Question to be answered: What do the results look like?

The related ESPON studies were screened according to the above-mentioned criteria. An overview is provided hereafter on the basis of following structure:

- Types of policies investigated

- Types of impacts investigated in relation to territorial goals
- Logic and formalisation of cause-impact relations
- Technique of analysis
- Periods of analysis / anticipation
- Territorial reference of outcome

3.1 ESPON 2.1.1 'Territorial Impact of EU Transport and TEN Policies'

Types of policies investigated:

The objective of ESPON 2.1.1 is to assess the territorial impacts of EU Transport and TEN policies. In this project the specific effects of infrastructure, and in particular the high-level infrastructures of the Trans-European Networks are considered. However, infrastructure cannot be analysed independently of the level and quality of service provided on the infrastructure. A second main strand in policy is that of regulation and pricing.

The project also investigates the territorial impacts of EU ICT policies. The three main ICT policies that the EU intends to implement are, according to the *Europe 2002 Action Plan* of the European Union: a cheaper, faster and secure Internet (focus on ICT investments on ICT infrastructure); investments in people and skills (adoption support policy); a stimulus for the use of the Internet (e-government, e-commerce, intelligent transport systems, i.e. a policy oriented towards service promotion).

Types of impacts investigated in relation to territorial goals:

The impacts of the EU Transport policy (mainly infrastructure and pricing policies) are investigated in terms of impacts on the regional GDP (NUTS3 level) and of accessibility at Europe-wide scale. The territorial goals taken as reference are polycentricity and economic and social cohesion at EU level.

The impacts of the EU ICT policies are investigated in terms of impacts on the regional GDP (NUTS 3 level).

Logic and formalisation of cause-impact relations:

Cause-impact relations are formalised in the context of three complex models:

- the SASI model is a simulation model of socio-economic development of regions in Europe which takes into account as input variables the economic and demographic development of the ESPON Space as well as transport infrastructure investments and transport system

improvements, in particular of the trans-European transport networks (TEN-T) and TINA networks. For each region the model forecasts the development of accessibility, GDP per capita and unemployment. In addition cohesion indicators expressing the impact of transport infrastructure investments and transport system improvements on the convergence (or divergence) of socio-economic development in the regions Union are calculated.

- the CGEurope model is a spatial computable general equilibrium model of goods transport and business passenger flows with monopolistic competition.

- the STIMA model is based on the estimate of a quasi production function and allows the role that ICTs play in regional performance to be measured. The enabling factors regard the general level of economic development of the country analysed, the regulatory regime that characterises the ICTs market in that country, the economic structure and the innovative capacity of the local area.

Technique of analysis:

The technique used is the elaboration of quantitative scenarios, using the various models. In the field of transport policies, the following scenarios were elaborated:

- A1 Infrastructure Implementation of all rail projects 1991-2001
- A2 Infrastructure Implementation of all road projects 1991-2001
- A3 Infrastructure Implementation of all projects (road and rail) 1991-2001
- B1 Infrastructure Implementation of all most probable rail projects 2001-2021
- B2 Infrastructure Implementation of all most probable road projects 2001-2021
- B3 Infrastructure Implementation of all most probable projects (road and rail) 2001-2021
- C1 Pricing Reduction in the price of rail transport
- C2 Pricing Rise in the price of road transport
- C3 Pricing Social marginal cost pricing of all transport modes
- D Pricing and Infrastructure: Implementation of all projects 2001-2021 and marginal cost pricing of all transport modes (B3 + C3)

In the field of ICT policies, three scenarios were elaborated:

- Scenario A is based on indiscriminate policy

- Scenario B called the 'efficiency scenario' is based on a strong discrimination in favour of more efficient regions towards which the main investments are directed

- In Scenario C (Cohesion Policy), the financial resources are devoted to lagging regions,

Periods of analysis / anticipation:

With regard to periods of analysis, two types of transport scenarios were elaborated:

- ex-post scenarios simulating with the models the possible evolutions during the decade 1991-2001

- ex-ante scenarios simulating with the models the possible evolution during the period 2001-2021

The ICT policy scenarios do not refer to a specific time period, but produce for each scenario the respective differences in annual regional GDP compared with the EU average

Territorial reference of outcome:

The scenarios produce maps of regional GDP (and of accessibility in the case of transport policies), making possible the elaboration of territorial typologies.

3.2 ESPON Study 2.1.2 'The Territorial Impact of EU Research and Development Policies'

Types of policies investigated

The study investigated the regional impacts of the EU and national R&D policy interventions. The objectives of the study were:

- to develop a 'typology' of regions, in terms of their capacity to undertake R&D and innovation.
- to assess the spatial distribution of R&D policy interventions- an important consideration in terms of assessing whether or not R&D policies support the concept of territorial cohesion.
- to assess the impact that these interventions are having on regional development *per se*. In particular, to what extent such interventions are supporting the 'catch-up', or convergence, of Less Favoured Regions.

Types of impacts investigated in relation to territorial goals

The territorial goals considered are those of cohesion and convergence. The study investigated how the Structural Funds and R&D policy could develop a more coherent and effective approach in promoting R&D capacities and territorial cohesion and how R&D policy at EU and

Member State level should be designed and co-ordinated to promote an equal access to knowledge infrastructures for all European territories.

Logic and formalisation of cause-impact relations

The methodology for the study was based upon the following assumptions:

1. The territorial impacts of EU R&D policy are caused principally through the operation of different financial mechanisms. Consequently a clear assessment of where this activity occurs is highly important, in particular:

- Actions supported through the EU RTD Framework Programmes (FPs) such as FPs 4, 5 and 6.
- Actions supported through the ERDF and ESF. Some actions may be supported through EAGGF but they are not considered here. In particular actions financed through Objective 1, Objective 2 and Innovative Actions.

2. The form that the effect will have will be influenced by the nature of the funding programmes, with an a priori assumption that this will be of the following form: business research, university research, research infrastructure, regional strategies.

3. The intended impacts of EU R&D would be to contribute to a strengthening of the regional R&D base leading to:

- Improved levels of R&D leading to increase in economic performance of firms and the region
- Improved quality of R&D leading to higher economic performance of firms and the region
- Increased commercialisation of R&D leading to higher economic performance of firms and the region
- Increased capacity to undertake R&D leading to increase in amount of R&D undertaken leading to higher economic performance of firms and the region

Technique of analysis

The study is examining the territorial impact of actions undertaken through the R&D Framework Programmes and those actions aimed at improving R&D capacity undertaken through the Structural Funds. A critical element of the study is to identify territorial imbalances and regional in R&D capacity and innovation. This has been undertaken through the analysis of a number of datasets that are comparable across the European territory.

Based upon the statistical data available, a regression analysis was undertaken to assess the effects of different factors on R&D expenditure and FP participation at a regional level. To model the effects of output, education, and high-tech manufacturing intensity on Research and

Development expenditure, we used a log-linear model. The model estimating the influence of the same factors over framework programme participation was a linear model. A total of 445 observations were available for analysis in the R&D expenditure model, and 233 for the Framework Programme participation model. Research and Development expenditure and output were converted into real (1995) prices by using the GDP deflator for each country in Euro terms, and then converted to purchasing power parity using weights taken from Eurostat.

Periods of analysis / anticipation

The temporal scale for the study was primarily backwards looking, building an assessment of what the territorial effects of EU R&D policy have been to date. In this respect the period 1994-2006 was primarily examined.

Territorial reference of outcome

The outputs were produced in the form of quantified indicators for the NUTS 3 regions. The indicators were related for instance to:

- Expenditure on R&D as a percentage of GDP
- R&D personnel as a percentage of the labour force
- Employees with Tertiary level education working in a Science and Technology Occupation as a percentage of total employment.
- Employment in High Technology and Medium High Technology
- Manufacturing as a percentage of labour force
- Employment in High Technology Services as a percentage of labour force
- Population with Tertiary Education
- Project Participation in the Framework Programmes

Concept and logic of T.I.A. according to the ESPON 2.1.2. Study[3]

The concept of TIA is meant as a tool or procedure for assessing the impact of proposed spatial development activities against spatial policy objectives or prospects for an area. In practice it should be able to identify:

- the positive and negative territorial effects of a policy, plan or programme, and;
- the means to accentuate the positive effects, and reduce or avoid the negative ones.

This process should, however, be seen as an aid to decision-making, rather than a decision-taking mechanism in its own right. TIA can cover different scales and aspects of decision-making. In the case of the EU's R&D policies, it is useful to use a tiered approach, which seeks to identify effects at the EU (macro); the trans-regional (meso) and regional (micro) scales.
The Framework Programmes represent policies and programmes that operate at a European scale, with trans-regional and regional effects occurring largely through the incidence of projects. In contrast, the Structural Fund instruments set the policy context at the European level, which are translated into regional (and sectoral) programmes – with their own priorities and policy mix set in the context of the instruments, which in turn provide the framework for projects.

The TIA approach thus needs to differentiate between the assessment of both scale effects (e.g. EU-level effects) and other effects of policies, programmes and projects. Key questions for assessment at the different scales are summarised in the table below:

Key Questions for assessment:
- **EU-scale**: How will the balance of R&D activity across the EU be affected by EU R&D policies?
- **Trans-regional**: Do EU R&D policies contribute to the development of successful interregional co-operation arrangements? Do these arrangements contribute to the development of complementary economic zones?
- Regional: How will R&D activities be influenced within a region by the combination of EU R&D policies?
Using these key questions and the TIA framework provided by TPG 3.1, the six stage approach to TIA for EU R&D policy is presented briefly below.

1. **Listing the spatial objectives (or goals) of the policy or programme** – The policy objectives of the ESDP, coupled with those which can be discerned in the Communication 'The Regional Dimension of the European Research Area' provide a guide in respect to EU R&D policies. It must be stressed that these are identified *spatial* objectives, which are not necessarily the primary goals of either the Structural Funds or the Framework Programmes. A detailed list of EU and trans-regional objectives is developed in section 9.4.1 of the main report

[3] ESPON Study 2.1.2. 'The territorial impact of EU research and development policy' led by ECOTEC. Final Report, pp. 22-23.

2. **Analysing existing objectives (EU, trans-regional or regional) of territorial development** - This provides an assessment of whether new of existing R&D policies complement, duplicate of contradict existing territorial policy objectives. As such objectives can vary greatly from region to region, any TIA methodology adopted at regional level should identify the goals specific to the region in question. The relevant unit for territorial analysis should also be fixed at this stage. The work undertaken for this study has demonstrated the difficulty of gathering data at a consistent territorial scale across the EU for a wide range of indicators. In some instances, the appropriate scale of operation is NUTS 1, in others it is NUTS 2; occasionally, it might be NUTS 3.

3. **Identifying the baseline conditions** -The territorial outputs that we are interested in relate to the desired results of the R&D policies, which include an increase in the capacity of regions to undertake R&D (measured in terms of infrastructure; personnel and (as a proxy) expenditure); a reduction in disparities in levels of R&D activity between regions; and the promotion of knowledge transfer from those regions that are generating high quality research outcomes to other parts of Europe. Relevant indicators include those used by this study (R&D expenditure etc), but the more qualitative key objectives of EU R&D policy, such as strengthening of linkages between actors in the innovation system and development of research infrastructure, are not measurable by standard indicators. In principle, assessment at the regional level may be more straightforward, as the data collection is less costly and qualitative assessments can be incorporated.

4. **Describing the measures contained in the policy or programme** – The incidence of particular measures that are included within the policy or programme will influence the overall territorial effects of these policies. For EU R&D policies FOI codes and FP participation rates provide a starting point for this. From this base, it is possible to identify what effects might be present and require further exploration

5. **Identifying other plans or programmes that may have an influence** – The territorial effects of EU R&D policies will also be influenced by the investment decisions of the public-sector, potentially set out in relevant plans and programmes, and those of the private-sector.

6. **Undertaking a cumulative assessment** – This involves a locational analysis to assess the geographic distribution of EU R&D policy interventions, a policy analysis has to assess the extent to which EU R&D policy might address identified spatial goals and a qualitative impact assessment to examine the extent to which EU R&D policy appears to address identified spatial goals in practice. Although a quantitative assessment of the impact of EU R&D policy may be desirable, the practical and theoretical difficulties of this are considerable. As such, we would favour the use of qualitative techniques, to avoid the dangers of spurious accuracy. Example tables, to assist in this process are proposed in the main report.

3.3 ESPON Study 2.1.3 'The Territorial Impact of CAP and Rural Development Policy'

Types of policies investigated

The objective of the research project was to deepen the understanding of territorial impacts of the EU's Common Agricultural Policy and Rural Development Policy. For the purposes of this study, the scope of the EU's CAP/RDP was taken to be the interventions in farming and farming-related activities undertaken by the Commission's DG Agriculture, for the purposes of pursuing Community objectives as set out in the various EU Treaties.

For this project, the scope of the CAP/RDP was taken to be the interventions in farming and farming-related activities undertaken by the Commission's DG Agriculture. These can be via expenditures from the European Agricultural Guidance and Guarantee Fund (EAGGF), through market price support, and/or via relevant EU Regulations and Directives.

Types of impacts investigated in relation to territorial goals

The main goals against which the impacts were assessed are the objective of polycentricity of the ESDP and the objective of cohesion of the EU Treaty. The territorial impacts and the incidence of CAP and RDP measures were assessed against the 'high-level' objectives of the Third Cohesion Report, namely balanced competitiveness, social and economic cohesion, and sustainability, at macro-, meso- and micro- levels.

Logic and formalisation of cause-impact relations

The study began with description, from a territorial point of view, of the agricultural sector and rural areas of the EU27 on the basis of ten indicators.

The absence of a realistic counterfactual or 'without CAP' scenario means that analysis focused on how support is/has been distributed and implemented between areas of Europe and the ways in which changes in the CAP have impacted on regional economies.

A set of hypotheses on the territorial impact of the CAP and RDP was grouped into categories based on the classification of CAP and RDP measures, on the grounds that each type of support (market price support, direct income payments, agri-environmental payments etc.) has played a distinct role within the CAP reform process and may have given rise to territorially distinct effects.

A key point to be borne in mind when considering the results is that the CAP is but one of many factors influencing farm-level decisions and agricultural and rural development. For this reason, the statistical analysis was supplemented with modelling and with a case study approach in order to explore, in more depth, the processes by which the CAP and RDP have led to territorially differentiated effects. In addition to validating and deepening the ex-post analysis carried out earlier, this second part of the project also helped to explore the possible implications of proposed future changes in the CAP and how these might differ across space.

Technique of analysis

The distribution of CAP support across different types of NUTS3 regions in Europe was analysed using three different regional typologies:

- A regional typology developed by the OECD (1996a),
- the urban-rural typology developed by ESPON project 1.2.1, and
- the clustering typology developed as part of this project

An initial hypothesis developed by the project team was that the distribution of the Pillar 1 support is not consistent with the economic or social cohesion objectives of the EU. To test this proposition, the relationship between the level of Pillar 1 support received by each NUTS3 region and GDP per inhabitant, unemployment rates and population change of each region was investigated. Correlation coefficients between Total Pillar 1 support and indicators of economic and social cohesion (GPD per head, unemployment rates and population change) were calculated. Correlation analysis was also used to investigate the relationship between the two policy instruments that comprise Pillar 1 of the CAP - MPS and direct income payments - and socio-economic indicators.

The level of Pillar 2 support was estimated in two ways. Firstly, by the sum of the value of environmental subsidies and LFA payments *received* by farmers again derived from the FADN database apportioned down to NUTS3 level. Secondly, through the apportionment of national Rural Development *expenditure*, in this case using FADN data as a means of distributing the country level totals between regions.

Case studies were undertaken to provide deepened insight into the core issues, i.e. detailed empirical information on the territorial incidence of the CAP/RDP and more evidence on the impact of CAP/RDP measures on the economic, social and environmental situation in regions of different types. Thus, the aim has been to improve the assessment of cause-effect relationships between policy instruments and economic, social and environmental outcomes through the case studies, which will primarily make use of existing work and studies. Within the selected case study areas the focus was on (more differentiated) territorial information about the application of CAP/RDP instruments, in particular the territorial (mainly regional)

effect of specific schemes (and/or the combined effect of policy programmes). The focus of the case studies was on the two following themes:

1. Farm household adaptation to changing policies and associated developments in pluriactivity

2. Good practice in territorial rural development

The selected policy instruments for the case studies were three major sub-programmes/schemes of CAP Pillar 2 instruments (including the accompanying measures established since the 1992 CAP reform, the LFA scheme, and examples of more integrated programmes, in particular LEADER).

Following the case studies of the specific Pillar 2 measures, the impacts of the Commission's proposals for the Mid-Term Review (MTR) of the CAP were analysed using output from the CAPRI (Common Agricultural Policy Regional Impact Analysis) modelling system originally developed at the University of Bonn during 1997-1999. The system involves physical consistency balances, economic accounting, considerable regional specification of (e.g.) set-aside rates, single farm payment (SFP) rates, etc., and standard micro-economic assumptions.

Periods of analysis / anticipation

The statistical analysis of indicators and data at NUTS3 level was carried out over the period 1990 to 2000.

A future-oriented simulation of the CAP reform (Mid Term Review) was made with the CAPRI model.

Territorial reference of outcome

Outcomes are quantified and presented at NUTS 3 scale for the EU territory.

3.4 'ESPON Study 2.1.4. Territorial trends of energy services and networks and territorial impact of EU energy policy'

Types of policies investigated

The aim of the study was to identify and measure, whenever possible, the links between energy policy and local development in the European Union regions. One of the aims of the study was to design and carry out a territorial impact analysis of the energy policy, seeking to quantify impacts from energy-related spatial development policies and identify a set of parameters that may apply to policy decision-making.

In recent years the following general areas of debate have been of particular importance for shaping a common EU energy policy:

- the internal-market for energy (electricity and gas),
- the environmental policy, and
- the European Energy Charter.

Types of impacts investigated in relation to territorial goals

The aim of the territorial impact assessment was be to clarify the differentiated territorial effects of energy policy and to quantify its effects on the economy and environment of the different European regions. The territorial goals against which the territorial impacts of the energy policy were assessed are those contained in the ESDP, especially the objective of polycentricity. Economic impacts were related to changes in regional GDP caused by variations of energy price.

Logic and formalisation of cause-impact relations

Links between energy policy and territory have three basic drivers: investment, prices and income transfer. Impacts of energy policy can then be measured in terms of industry development, welfare and environment.

Five different types of energy territorial impacts were identified:

- Direct employment and GDP
- Location and competitiveness factor
- Income transfer
- Households behaviour and quality of life
- Environment

The attention was especially focused on the impacts operating through energy prices, that is, the impact on industry location and territorial competitiveness. The procedure used consisted in the distribution of the impact calculated at a national level among the different regions of a specific country. For that, in a first step, the impact of a decrease in the price of final energy on gross value added of each national branch was calculated and, in a second moment, the impact of each branch was distributed among the different regions of that country.

Technique of analysis

Data collected were used to develop a typology of regions as a tool for identifying regional 'types' and assist consideration of the policy implications.

The territorial impact analysis of energy prices variations was made using Input- Output modelling.

Qualitative data analysis occurred through case studies for assessment of specific regional impacts in different countries.

Periods of analysis / anticipation

Simulations (regional economic impacts of changes in energy price) and calculations of the sensitiveness to new regulations (Kyoto, renewable energy sources) had a static character.

Territorial reference of outcome

The scale at which outcomes were produced was either the national or the NUTS 2 levels.

3.5 ESPON Study 2.1.5 'Territorial Impacts of European Fisheries Policy'

Types of policies investigated

The European fisheries policy (CFP) is regarded as one of the sector policies with substantial implications for amongst others employment, cohesion and regional economic strength, and particularly in some coastal regions and in fisheries dependent areas.

The most recent changes in the European Fisheries Policy (CFP) were adopted in late 2002, and a number of measures will be implemented in the near future. The main aim of the changes is to strengthen the competitiveness of the sector and to ensure its sustainability. The policy includes:

- Conservation of fish stocks
- Restructuring of fishing and fish farming
- Organisation of the market for fish and associated products and agreements on fishing with third countries
- Agreements on fishing with third countries

The most important changes with likely implications for the fishing industry, and particularly for employment in the sector are:

- Multi-annual management plans for all stocks
- Reductions in quotas
- Reductions in the fishing fleet
- Limitations on how, when and where fishing can take place
- Limitations on financial support for modernizing and building of new vessels

Types of impacts investigated in relation to territorial goals

The analysis of territorial impacts of changes in CFP, concentrates on the following elements:

- Impacts on employment, social cohesion and demography
- Impacts on regional economic strength
- Impacts on environment and coastal zone management

The main goals against which the impacts of the fishery policy are assessed are those of territorial balance and cohesion on different geographical levels as well as sustainable development and also ESDP-perspectives focusing on polycentric development.

Logic and formalisation of cause-impact relations

The starting point for estimating the territorial distribution of economic policies measures of the CFP (FIFG) at regional level according to the national averages is a comparison of the proportion of economic policies measures in each of the regions and the national average. As with the fisheries specialisation indexes, this solution enables an identification of regions with low and high indexes in a national context.

Technique of analysis

A number of hypotheses were elaborated about the impacts of the EU fishery policy on the regions. A number of empirical statistical analyses were carried out to test the validity of these hypotheses.

FIFG Territorial distribution indexes are calculated on Nuts 2 level. The procedures of the calculations are as follows:
1) Calculation of EURO per year per employee in the fisheries, 1995, country level.
2) Calculation of EURO per year per employee in the fisheries in the regions.
3) Calculate the level of each country's lower level region compared to the country's 100.
4) The regions with an index above 100 are defined as regions with FIFG distribution above the country average.
5) The results are entered into maps. The costal regions are plotted with colours according to the index indicating their share of the FIFG.

Considering that changes in CFP did not take place before late 2002 and that many measures have just been implemented or about to be implemented, following approaches are adopted to anticipate the possible territorial impacts.

1. the simulation of changes in policy interventions by the use of models and assessment techniques developed in previous researches and based on example studies;

2. a judgement evaluation, based on a SWOT analysis, or other qualitative techniques, of what has been planned to be the financial support to the European enlarged fishery sector for the period 2007-2013, by mean of the new financial instrument, the European Fishery Fund (EFF).

Periods of analysis / anticipation

The various empirical statistical analyses were carried out for a period corresponding broadly to the second half of the 1990s. The distribution of FIFG resources was calculated for the period 1995-1999.

As the final report of ESPON Study 2.1.5 is not yet available, it is not possible to provide information on the periods of anticipation of modified policies.

Territorial reference of outcome

Main outcomes are presented at national and, in a number of cases at NUTS 2 regional levels. Severe constraints on data availability have been mentioned.

3.6 ESPON Study 2.2.1 'The Territorial Effects of the Structural Funds'

Types of policies investigated

In the context of this project both the Structural Funds and the Cohesion Fund were analysed, though in the report reference is usually made to 'Structural Funds' as a shorthand expression.

Types of impacts investigated in relation to territorial goals

The focus of the study is on the mapping of the Structural Funds and assessing their contribution to the aims of spatial development policies, with particular emphasis on territorial cohesion and polycentric development. The study has sought to establish the possible links between Structural Funds intervention and the promotion o territorial cohesion and polycentric development (as a particular operationalisation of territorial cohesion)

Territorial Cohesion is seen to address the potential, the position and the relative situation of a given geographical entity. It can be analysed and operationalised at various geographical levels or scales, i.e. at the *micro*, *meso* or *macro* levels. Polycentricity addresses the aspects of morphology, accessibility, functional specialisation and cooperation links of an area. Polycentric development is used as a bridging concept merging the policy aims of economic growth and balanced development.

Logic and formalisation of cause-impact relations

There are two main ways in which the Structural Funds may influence spatial development:

- firstly**,** there is potential inherent in the spatial nature of the funds themselves and there is the potential expressed in the area designation process.

- secondly, the form of intervention also influences spatial development. Some policy forms may have more explicit spatial impact than others.

In this respect, the territorial impact assessment of the Structural Funds has been approached from three directions:

- *Territorial Development:* analysis of the developments occurring across the European territory at the lowest level possible, where ongoing spatial development and the investments of the Structural Funds were mapped. Assessments were carried out regarding the coincidences between Structural Fund spending and spatial developments in terms of GDP,

demographic change, changes in the relative economic position of a region (economic concentration) and transportation.

- *Governance and Policy Development:* analytical approach to the policy dimension. This comprises the governance of the Structural Funds in the various countries, as well as their conformity to national policies. The aim here was to identify a set of potential typologies for spatial policies. Another aspect of this dimension is the influence of Interreg on the formation of trans-national macro-regions.

- *Causal Links:* Comparing actual spatial development patterns to Structural Fund investment by region shows where development and investment coexist. This does not however allow for conclusions on the causal links between them. In order to pin down the territorial effects of the Structural Funds and to investigate further the causalities involved, 15 case study regions were studied with regard to their causal relations.

Technique of analysis

A two-fold approach was applied:

- firstly, the project presents a comprehensive picture of the Structural Funds, including both the mapping of the geography of Structural Funds and an analysis of their spatial implications (for 1994-1999 period).

- secondly, the focus is put on an in-depth analysis of specific aspects and areas in order to discuss a more detailed picture of the territorial effects and impacts of the Structural Funds, both in terms of the policy content and nationally regionally specific implementation practices.

The study of past programmes (1994-1999) was conducted by reviewing a large amount of evaluation documents and literature. In the case studies, a more explicit connection to the current programming period was also made, with evaluation reports forming part of the empirical material used in order to chart the perceived changes and effects from the previous programming period to the current one (and beyond).

The review of the current Structural Fund programmes (2000-2006) was also conducted by means of extensive desk-bound research. This also encompassed a preliminary review of trends in national regional policies, where country experts were used on a sample of Structural Fund programming documents and complements.

A major aspect of the work concerned the development of typologies relating to GDP spending and to the growth of GDP and Structural Fund spending.

The principle of the analysis was the comparison between the regional pattern of Structural funds spending and the territorial objectives corresponding to cohesion and polycentricity at different scales. This technique made possible to validate or invalidate a number of a-priory hypotheses. No macro-economic models were used to simulate the theoretical impacts of Structural funds on regional GDP.

Periods of analysis / anticipation

The focus was on the programming period of 1994-1999, mainly due to the fact that it was deemed too early to judge the final effects and in particular, impacts, of the 2000-2006 activities. Where possible, references were however also made to the current programming period, as well as to the post- 2006 regime.

Territorial reference of outcome

The outputs were mapped using NUTS 3 regional units.

3.7 ESPON Study 2.2.2 'Pre-Accession Aid Impact Analysis' ("Territorial Effects of the Application of the EU 'Acquis' and Community Policies as well as Pre-Accession Aid and PHARE")

Types of policies investigated

The objective of the project has been to conduct a comparative territorial analysis of the national instruments of structural policy in the new Member States, who joined the EU in 2004, and the Candidate Countries Bulgaria and Romania. Different related policy instruments, including not only pre-accession aid and Structural Funds but sector policies, national regional policies etc. have been reviewed.

In the report, the term pre-accession aid is generally used not only for ISPA, SAPARD and PHARE funds of the latest programming period, starting in 2000, but also refers to earlier PHARE, PHARE CBC etc. allocations before the year 2000.

Types of impacts investigated in relation to territorial goals

The analyses concentrate on the objectives of spatial cohesion (convergence), competitiveness and integration, while the objective of polycentrism is referred to only selectively, which is largely due to its close relation with the other objectives under consideration.

Changes in GDP per capita and unemployment are confronted with the above-mentioned objectives.

Logic and formalisation of cause-impact relations

Research has been driven by the theoretically grounded insight, that regions benefiting from EU funds are struggling with specific regional bottlenecks, which can not be expected to be resolved by market forces in an appropriate way within a justifiable time. It further assumes, that while some regions are lagging behind other regions possess development potentials and growth potentials, which may not be mobilised by market forces in a sufficient way either.

The measures of EU common policies are differentiated between income support measures, regionalised structural measures, horizontal structural measures and sector policies only some of them being relevant for the analysis of pre-accession aid.

The utilisation of the potential analysis concept allows assessing spatial effects as far as measurable potential indicators are affected by this kind of interventions and therefore indirectly provides information on spatial impacts of pre-accession aid, which is otherwise difficult to identify.

Technique of analysis

Due to a number of factors limiting the analyses, there is no single methodological approach but a number of different access points attempting to shed light on territorial impacts of pre-accession aid interventions at different spatial scales.

Taking the concept of potential endowment as reference basis for territorial impact assessment (TIA), regional potential endowment had first to be analysed.

- Labour Market Potential
- Innovation Potential
- Regional Market Potential and Geographic Position
- Urbanisation and Localisation Advantages
- Institutional Potential

Based on the factors describing bottlenecks, potentials and policy inputs an uncomplicated model with regard to the interrelations between these three influences has been outlined. These influences concern:

- potentials describing the situation before intervention as well as trends observed;
- bottlenecks describing lacks of potentials;
- policy inputs and outputs referring to the strategy of intervention

and their effects on the outcome of territorial impacts, referring to the realisation of policy objectives as well as widening regional bottlenecks and mobilising regional potentials for development.

In order to quantify impacts of pre-accession aid, interventions have been related to the development of potential indicators through correlation analyses. Regression analyses indicated causal relations between the regional potential provision and socio-economic impact indicators. The first correlation set gives an overview over relations between total and potential-oriented pre-accession aid spending and different potential indicators as well as their changes throughout the period under consideration. The latter supplements this overview with the respective correlations of potential indicators with economic performance change measured in terms of unemployment change and GDP per capita (PPS) change over the same period. Thus, the latter relates potential and impact variables to each other not regarding pre-accession aid allocation. Therefore, the correlation analyses can be regarded as a stepwise process, in which the potentials are utilised as interim indicator for overall impact assessment,

Average annual PHARE, PHARE CBC and ISPA spending between 1998 and 2000 as percentage of average annual GDP was calculated and compared with SF spending.

A number of case studies were also carried out in order to highlight both quantitative and qualitative aspects. An ex-ante analysis of territorial impacts of Structural Funds and Pre-Accession Aid was realised.

Periods of analysis / anticipation

The analyses are based on the latest possible years of pre-accession aid programming, i.e. the period between 1998 and 2000 and to some extent also the following years 2001 and 2002.

As policy interventions from 1998 onwards are under consideration, potential analysis also takes the years 1998/99 as reference period. Utilisation of this reference period allows to directly relating regional pre-accession aid interventions to the regional potential endowment.

Territorial reference of outcome

Outputs are presented at NUTS 2 and 3 levels.

3.8 ESPON Study 2.2.3 'Territorial Effects of the Structural Funds In Urban Areas'

Types of policies investigated

Policies related to Structural Funds, including the Urban Community Initiative. The types of intervention that are considered are those that have been supported through the European Social Fund (ESF) and the European Regional Development Fund (ERDF).

The interventions that are considered in the context of the use of Structural Funds in urban areas have been influenced by the request of the Commission to focus on:

• Structural Fund expenditure undertaken within urban areas, rather than those which might seek to develop the role of the urban area as a regional growth centre.
• Those activities that are led by urban organizations, rather than regional or national bodies.

Types of impacts investigated in relation to territorial goals

Key objective of the study is identifying the goals against which the assessment should be made. For the purposes of this work these have been taken from the ESDP. At an EU-level this would suggest the following:

- Expanding the strategic role of metropolitan regions and gateway cities, giving particular attention to the development of peripheral regions in the EU.
- Strengthening a polycentric and more balanced system of metropolitan regions, city clusters and city networks
- Improvement of the economic basis, environment and service infrastructure of cities, particularly in economically less-favoured regions, in order to increase their attractiveness for mobile investment
- Support for the economic development of towns and cities in less favoured regions

At a programme-level it is assumed that the goals are to support the positive development of urban areas by:

- Expanding the strategic role of metropolitan regions and gateway cities
- Strengthening a polycentric and more balanced system of city clusters and city networks
- Improvement of the economic basis, environment and service infrastructure of cities, in order to increase their attractiveness for mobile investment
- Promotion of economic diversification in cities that is too dependent on a single branch of economic activity

- Tackling social exclusion and promoting the recycling and/or restructuring of underused or derelict urban sites and areas
- Wise management of the urban eco-system
- Promoting better accessibility in cities and metropolitan regions through an appropriate location policy and land use planning that will stimulate mixing of urban functions and the use of public transport
- Reducing uncontrolled urban expansion and reducing excessive settlement pressure
- Strengthening small and medium-sized towns in rural areas as focal points for regional development and promotion of their networking
- Maintenance and creative redesign of urban ensembles worthy of protection

Logic and formalisation of cause-impact relations

The initial assessment of the territorial effects of the Structural Funds in urban areas focuses on the extent to which urban areas benefit from Structural Fund expenditure.

The Structural Fund instruments set the policy context at the European level, which are translated into regional (and sectoral) programmes, which in turn provide the framework for projects. The TIA approach thus needs to differentiate between the assessment of the EU scale policies (EU- level effects) and the assessment of the Programme policies (Programme- level effects).

In order to assess the overall focus of Structural Fund programme activities in urban areas the analysis was divided both by the type of programme (Objective 1, 2 etc) and types of activity supported, based on the following four categories:

- Facilitating structural change and combating its negative effects
- Social sector and human resources
- Improvement of the physical urban environment and transport
- Ecological environment

The following TIA approach was adopted:

1. Listing the objectives (or goals) of the policy or programme
2. Analysing the existing objectives (EU, national, regional or urban) for urban development
3. Identifying the baseline conditions
    a. Outputs to be registered
    b. Indicators to be used
4. Describing the measures contained in the policy or programme
5. Identifying other plans or programmes that may have an influence
6. Undertaking a cumulative assessment
    a. Techniques to be used

Technique of analysis

In seeking to unravel the cause and effect chain between underlying *conditions* and resulting *outcomes* in urban areas, factor analysis was undertaken in order to better identify the principal determinants of urban performance. This was used in parallel with multi-criteria analysis.

Factor analysis is concerned with identifying the relative 'weight' or contribution different sets of conditions or features (factors) make towards the realisation of a resulting outcome. Within the current study context, the key question therefore, is what constitutes the major determinants of European urban performance? Two or three main urban outcomes (GDP per Capita, Employment/ Unemployment Rate) were suggested; analysis of the various components of urban conditions (Industrial Structure, Economic Activity, Labour Supply etc) being directed at seeking to identify the principal determinants of these outcomes.

The most straightforward approach to factor analysis involves using regression techniques. Exploratory regressions are, for example, performed across a number of different urban condition indicators (Tertiary Education attainment, Service sector employment etc) on various data series contained in the database using key outcomes (i.e. GDP per Capita or Employment/ Unemployment Rate) as constant dependent variables in each case.

A series of 48 case studies was also carried out, for which specific data were collected.

Periods of analysis / anticipation

Data used concerned mainly the period 1994-1999.

Territorial reference of outcome

Outputs were both quantitative and qualitative. The regional level was used (NUTS 3 level), but no map was produced.

3.9 ESPON Study 2.4.1 'Territorial Trends and Policy Impacts in the Field of EU Environmental Policy'

Types of policies investigated

The ESPON 2.4.1 project is envisaged to present territorial trends, situations and structures at European scale in relation to the main environmental issues of relevance for the development

of regions and larger territories. It should give proposals on feasible Territorial Impact Assessment (TIA) of EU Environmental Policy based on test studies related to at least three major elements of European environmental policy.

The policy elements more deeply investigated in the project are the Strategic Environmental Assessment, the Habitats and Birds Directives and the Water Framework Directive

The ESPON project 2.4.1 has selected one policy from each of the spatial dimensions for the assessment of territorial impacts:

- Civil Protection and Environmental Accidents Policy represents the site-specific spatial dimension,

- Nature and Biodiversity the network dimension,

- Water Policy the area-wide dimension and

- for the cross-sectoral dimension Strategic Environment Assessment Directive is studied.

Types of impacts investigated in relation to territorial goals

The methodology for the territorial impact assessment of EU Environmental Policies is designed in a way that ESDP policy options can be operationalised. The methodology developed in the ESPON project 2.4.1 has concentrated on the impact on territorial cohesion in its three dimensions as identified by the ESPON project 3.2 (territorial quality, efficiency and identity).

Examples of possible impact indicators are: increase of protected sites due to Natura 2000, impact of afforestation on soil erosion and desertification and urban growth.

Logic and formalisation of cause-impact relations

The TIA methodology that is suggested by the ESPON 2.4.1 project has – similar to the methodological framework suggested in the ESPON project 3.2 framework – two levels:

1. On the first (or general or European or abstract) level, basic connections and influences between policies (e.g. environmental policies), territorial trends (e.g. socio-cultural, economic, transport etc.) and territorial objectives (in the first instance territorial cohesion that has been divided into three elements, territorial quality, efficiency and identity) are identified and quantified. This approach follows the three phases of scoping, analysis and finally assessment. This first level has been described by project 3.2 as 'potential impact (PIM)'. This assessment is done against the goal of territorial cohesion.

2. On the second (NUTS3 level) level an estimation of the territorial effects of EU Environmental Policies on a certain region taking into account the regional performance of chosen indicators will be carried out ('Territorial impact model for assessing the impact on single regions TIM').

The key policy elements are classified according to their implementation phase:

- Category A includes existing policy instruments,
- Category B the policy elements that are in implementation phase,
- and finally category C those policy elements that are under regulation development in the EU level.

The policy elements can be further divided into three classes according to the policy impact mechanism:

- Regulatory elements are the policy elements consisting of specific rules included in national laws (EU ordinances and directives).

- Funding mechanisms are the mechanisms that support the policy development (structural funds, special funding programmes like LIFE, solidarity fund etc.).

- Others should be described more in detail if relevant for a certain cause effect chain.

Technique of analysis

As only the First Interim Report is available, not all elements of the technique of analysis are known. The methodology to be developed will take into account the following principles:

- Three-level-approach as the appropriate typology group for the analysis of environmental policies (as shown in the Crete Guidance Paper, ESPON, 2003, p. 11 and the Matera Guidance Paper, ESPON, 2004, p. 10f.),

- TIA minimum requirements as shown by the ESPON 3.1 project, Final Report, Part C, Annex 7 (ESPON project 3.1, 2004, pp. 453ff.),

- Further development of a TIA methodology as described in the ESPON project 3.2 Working Document and discussed on the ESPON Seminar in Manchester, 7-8 October 2005 (ESPON project 3.2, 2005).

The long chains from policy elements through trends to territorial objectives will be applied for the analysis of effects related to each of the three environmental policy elements. Both general territorial trend and specific environmental trends should be considered. For Category A policy

elements historical development trends have to be considered while the identification of cause-effect chains related to Category B and C should be based on expert's judgements of potential trends.

In the PIM phase, the long cause effect chains can be classified therefore into four groups:

- **Plus-Plus:** A policy element has an increasing effect (moderate = 1, strong = 2) on a trend that has a positive impact (+1 or +2) on a territorial objective. The overall effect is positive (+).

- **Plus-Minus:** A policy element has an increasing effect on a trend that has a negative impact on a territorial objective. The overall effect is negative (-).

- **Minus-Plus:** A policy element has a decreasing effect on a trend that has a positive impact on a territorial objective. The overall effect is negative (-).

- **Minus-Minus:** A policy element has a decreasing effect on a trend that has a negative impact on a territorial objective. The overall effect is positive (+).

The observed long cause effect chains are classified into two groups according to the long cause effect chains:

- Effect chains with overall positive effect on the studied Territorial objective: Plus-plus and minus-minus chains.

- Effect chains with overall negative effect on the studied Territorial objective: Plus-minus and minus-plus chains.

In the TIM phase the final judgement based on policy elements and observed or expected trends on each region should be made.

The recognized indicators representing cause effect chains as identified in the PIM phase will be calculated for the studied NUTS3 regions and the values are reclassified into scale 0-1 (TEQUILA model). The cause effect chains are weighed (TEQUILA model) and given plus or minus sign according to the overall effect (PIM in the TEQUILA model). The weighed sums of cause-effect chains will be calculated for each of the three territorial objectives. The end product will be three maps showing the overall impact of the studied environmental policy on regions for the three Territorial Objectives.

Four case studies (Finland, Slovenia, Andalusia, Emsland) will be carried out.

Periods of analysis / anticipation

No precise period of analysis is indicated. For some trend analyses (for instance urban growth), the period 1990-2000 will be used. The impact assessment seems to be more of a systemic/static type.

Territorial reference of outcome

Outcomes are not yet available (First Interim Report). Only the principles are provided.

On the regional level (NUTS3 level) level, an estimation is made of the territorial effects of EU Environmental Policies on a certain region taking into account the regional performance of chosen indicators (called 'Territorial impact model for assessing the impact on single regions (TIM)' by the ESPON3.2 project).

3.10 ESPON Study 2.3.1 'Application and effects of the ESDP in the Member States'

Types of policies investigated

The focus of the study is the application of the European Spatial Development Perspective (ESDP), which was adopted at the Potsdam informal Ministerial Council meeting in May 1999.

Types of impacts investigated in relation to territorial goals

The impacts investigated are the forms and intensity of application of the ESDP policy options in the member countries as well as in transnational cooperation areas. The territorial goals are the policy options themselves. A major objective of the ESDP is that of polycentricity. Collaborative working and integration are also considered as an important potential impact of the ESDP application.

Logic and formalisation of cause-impact relations

The ESDP lays down guidelines, aims and options for spatial development, but it is very general and therefore difficult to 'apply'. The main contribution of the ESDP must therefore be assessed in terms of the dissemination of best practice in spatial planning and in highlighting European issues that are not usually at the forefront of national policies. The application of the ESDP is however rather difficult to trace, as it is usually indirect and implicit rather than direct and explicit in nature.

At the European level, four areas of ESDP application are studied:

- Sectoral policies and programmes of the European Commission
- The INTERREG programmes
- The Tampere ESDP Action Programme
- CEMAT – the spatial planning co-operation of the European Council

The degree to which the 29 ESPON countries have used the ESDP has been assessed by national experts on the basis of a series of questions regarding:

- planning traditions,
- application at different spatial levels and different policy sectors,
- the timing and importance of the different ways of application,
- differences over time and between regions.

Technique of analysis

At the stage of the Second Interim Report, following information is provided about the technique of analysis.

A number of working hypothesis were formulated. On that basis, four different studies have been carried out. These are an EU-level study, a national study based on 29 national reports, a case study based on 24 cases and a web- based questionnaire study. In the four studies a number of different methodologies and data sources have been used and analysed separately.

The case studies are intended to act as illustrative examples of how the ESDP has been applied in practice through a variety of different mechanisms. The specific case studies were chosen to explore a variety of types of ESDP application.

A survey technique was developed. National experts were asked to determine in which fields the ideas of the ESDP were used. They were also asked to assess the degree of application of each of the 62 policy options presented in the ESDP. For this purpose, a web-based questionnaire was developed. In addition, to illustrate how ESDP topics are understood throughout Europe, 24 cases were studied in more detail.

Periods of analysis / anticipation

The period of analysis stretches from 1999 when the ESDP was adopted up to the present time.

Territorial reference of outcome

Outcomes are mainly of qualitative nature (although some statistical analyses were also carried out). The territorial references are mainly the national level as well as transnational cooperation areas.

3.11 ESPON Study 3.4.2 'Territorial impacts of EU economic policies and location of economic activities'

Types of policies investigated

The policies investigated are the regional and local economic policies as well as EU-level macro-economic policies.

Types of impacts investigated in relation to territorial goals

The impacts investigated are regional growth and competitiveness in relation with the objectives of socio-economic and territorial cohesion and of polycentricity.

The impacts of regional policies or programmes on aggregate employment or revenue as well as on the location of FDI will be investigated.

Logic and formalisation of cause-impact relations

The connection between 'regional competitiveness' and regional policies is investigated. It goes through an analysis of drivers of regional competitiveness in order to identify the levers for policy intervention.

The analysis of macro-economic impacts concentrates on policies of economic integration and of monetary union, in order to identify some of the elements of impact which could be approached at least through proxies, leading to suggestions concerning a possible approach for testing the impact of monetary union.

Technique of analysis

At the stage of the Second Interim Report, not all techniques of analysis are formalised. Literature reviews are being carried out. A survey is also being carried out among the network of ESPON ECPs asking them to provide budgetary data from two regions per country as basis

for an analysis of the current budgetary priorities in Europe's regions. A total of 9 case studies is foreseen, selected according to structural economic types.

Concerning the impacts of macro-economic policies, one or two methods will be tested (simulation through the MASST model developed by project 3.2 and applied in 3.4.2 for simulating different policies).

Periods of analysis / anticipation

A number of analyses are carried out for the period 1995-2002.

Territorial reference of outcome

Outputs, with the exception of literature analysis, are not yet available. It is therefore too early to describe their territorial reference.

Comparison and synthesis of policy impact approaches in the ESPON studies

The eleven policy impact studies examined above show a rather strong diversity in the approaches adopted. This diversity reflects the heterogeneity of the policies themselves which influence the evolution of the territory through the application of rather different instruments and measures. Diversity is however stronger in the field of techniques of analysis than in that of types of impacts investigated or in that of logic and formalisation of cause-impact relations. Only a few policy impact studies are future-oriented and produce substantial simulations of possible territorial impacts of future policies.

Similarity of territorial goals taken as reference

The territorial goals taken as reference for the policy impact analyses are those of the ESDP (mainly polycentricity) and of the EU Treaty (economic and social cohesion, sustainable development). The objective of territorial cohesion is often mentioned, although it is not yet in the Treaty. A few studies pay particular attention to the respective relationships between territorial cohesion, polycentricity and economic and social cohesion, showing that these are not totally identical, especially when considering the various territorial scales.

The types of policy impacts investigated are reflecting these common goals, but depend also upon the characteristics of the policies analysed. Numerous impacts are related to regional wealth and attractiveness (GDP, level of unemployment). Others are more specific (accessibility, flows of FDI, level of access to knowledge infrastructure, demography/migrations, level of emission of greenhouse gas, soil erosion, desertification).

The logic and formalisation of cause-impact relations depends mainly upon the policies considered

In accordance with the 'minimum TIA requirements' developed in ESPON study 3.1.; most studies have elaborated hypotheses upon the cause-effect relations. These are derived partly from theoretical literature and partly from EU policy documents. The nature of hypotheses strongly reflects the policies considered.

While in a number of studies a rather 'loose' set of hypotheses is presented, other studies rely upon complex, integrated models (SASI, CGEurope, STIMA in the case of transportation and TENs, CAPRI in the case of the CAP, MASST in the case of macro-economic policies).

More recent policy impact studies (2.4.1. on policy impacts in the field of the environmental policy) use already the logic of the TEQUILA model developed hereafter, with two levels of interactions:

- a general (or European) level with basic connections and influences between policies, trends and territorial objectives;

- a regional level taking into account the specific characteristics of each of the regions concerned.

Diversity of techniques of analysis

Most studies attempt to validate or invalidate the hypotheses elaborated. The techniques used vary however widely:

- a number of studies use rather simple quantitative statistical techniques (regression and correlation analyses);

- others carry out simulations by using complex models and produce quantitative ex-post or ex-ante scenarios;

- a third category analyse the impacts more qualitatively, explaining generally the processes at work.

Numerous studies are confronted with the lack of appropriate data, a fact which considerably limits the process of validation/invalidation of selected hypotheses. Although indicators are widely used in the policy impacts studies, a number of them are only proxies.

Periods of analysis and anticipation

The periods of analysis are strongly related to the availability of homogeneous data. Most studies are based on a period of time covering broadly the years 1995-2002, which is rather short to study in-depth the impacts of policies, especially when these are changing over time. Some studies refer to specific periods, such as the programming periods of Structural Policies (1994-99; 2000-2006) or the period following the adoption of the ESDP (after 1999 and up to now).

As stated above, only a few studies are future-oriented and refer to precise periods of anticipation. The study on the territorial impacts of EU Transport and TEN policies has produced a series of scenarios for the year 2021. Various policy impact studies produce speculations about the future evolution of policies and their possible territorial impacts, however without indicating a precise time period and without delivering quantitative information for the future.

Territorial reference of outcome

As most policy impact studies are quantitative in character, the outputs are produced at regional level (NUTS 2 or 3) and are in general mapped at Europe-wide scale. In a number of cases however (energy policy for instance), only a few data are available at regional level and outputs are produced at national level. Only few studies (for instance that on ESDP applications) consider transnational cooperation areas as a territorial reference for presenting outputs.

4 Causality relations

The search of univocal causality relations in territorial development related to public policies is a difficult exercise because numerous factors, in addition to policies, generally interfere. It is however possible to deduct from theories a number of possible explanations of the territorial evolution empirically observed. This exercise has been made for four EU policies: CAP and RDP, macro-economic policies, R&D policies and Transport Policy.

EU policy: CAP and Rural Development Policy[4]

Main policy area	Measures	Causality of territorial impacts
Pillar 1	Pillar 1 comprises: • commodity market support regimes with intervention buying or private storage aids • 'lightweight' regimes with emergency buying and producer group support • direct payments, often with quotas and/or reference yields and area ceilings to limit expenditure • supply management tools such as quotas on milk supplies, maximum stocking densities and compulsory arable set-aside • other elements such as environmental or animal welfare requirements, 'outgoer' (e.g. dairy) schemes and	• Maintain of income in rural areas, especially in the field of agriculture generated by the attribution of additional resources to farmers (direct payments and market price support); • Interregional financial transfers from consumer regions (metropolitan areas) to producing regions (rural areas) through the price support mechanisms; • Possible increase of regional imbalances, since most productive and fertile rural areas receive more CAP support (market price support or direct payments to farmers) than the more disfavoured ones. Direct payments have alleviated, but not suppressed this impact counteracting cohesion. • Reduction of the number of farms through the development of economies of scale and concentration of production; abandonment of small farms. Possible increase of rural

[4] Cf. ESPON Project 2.1.3 'The Territorial Impact of CAP and Rural Development Policy', Final Report, 2005.

	grubbing-up aid.	employment; • Development of set-aside land (regeneration, but possible deterioration of traditional rural landscapes) caused by the CAP regulations on set-aside policy. • Possible out-migration of population from rural areas caused by the reduction of the number of farms and the necessary increase of productivity in agriculture for farms to survive.
Pillar 2	Pillar 2 covers structural and rural development measures such as: • aids for farming in Less Favoured Areas and now in areas with environmental restrictions • agri-environment schemes • support for farm forestry • aid for farm investment, modernisation, and diversification • aids for marketing and processing • early retirement aids, and aids for young farmers • vocational training, • aids for improved water management, land re-parcelling and land improvement(Article 33 of Regulation 1257/1999) • support for developing farm-	• Additional resources to farmers in less-favoured areas, contribution to socio-economic cohesion generated by the attribution of financial resources to specific measures in less-favoured areas; • Development of rural tourism, of SMEs and handicraft (economic diversification of rural areas) supported by subsidies to investments from the Structural Funds; • Attenuation of the risk of further unemployment in rural areas through the development of labour-intensive practices (organic farming) and the support to small farms in less-favoured areas; • Maintain of the population or attenuation of demographic decline in rural areas in relation to lower risk of unemployment in less-favoured areas; • Facilitation of the implementation of the Natura 2000 Programme and therefore enhancement of valuable natural areas made possible by the attribution of

	related tourism and craft activities (Article 33) • other farm-related rural development provisions (Article 33)	subsidies to farms which contribute to the implementation of the Natura 2000 Programme; • Improvement of the environment through the development of less-polluting agriculture (especially diffuse pollution of ground water resources); • Increase of the surface of forested areas through the attribution of subsidies to forestation initiatives; • Improvement of water management in rural areas (mitigation measures against drought and flooding, reduction of impacts of water-related natural hazards). Contribution to economic and environmental sustainable development of rural areas through the attribution of subventions to water management measures in rural areas in the context of the RDP; • Limitation of the risks of forest fires through better forest management related to the attribution of subventions to better forest management in the context of the RDP; • Protection and enhancement of rural landscapes, as factor of identity and tourist potential through the attribution of subventions to the protection and enhancement of rural landscapes in the context of the RDP.

EU policy: Macro (EU-wide) policies[5]

Main policy area	Measures	Causality of territorial impacts
European Monetary Union (EMU)	**Creation of EMU**	The creation of a single currency reduces transaction costs across national borders, suppresses certain types of national macro-economic regulations instruments (such as devaluation or revaluation) and requires a coordination of macro-economic policies. • Stronger geographical mobility of production factors facilitated by the suppression of monetary transaction costs. Migrations within Europe are however rather counteracted by the existence of cultural and institutional barriers. • Generation of asymmetric shocks among EU countries and regions (especially in the case of highly specialised regions) made possible by the unification of the monetary market and the suppression of various regulation instruments. The importance of labour mobility depends upon how sensitive the regions are to asymmetric shocks. • Cross-countries correlations on business cycle have been increased by the coordination of economic policies.
	Role of the ECB : **Increase in real interest rate**	Increase in real interest rate has a negative impact on investments, making them more expensive, and affects more particularly the regions where heavy industrial investments have to be made. • Negative impacts all over Europe; • Highest negative impacts in Eastern countries; • Lower negative impacts in western countries, especially in a number of agglomerated regions and mega-regions.

[5] Cf. ESPON Project 3.4.2. Draft Final Report, May 2006.

	Role of the ECB : Revaluation of the exchange rate	Revaluation of the exchange rate has a negative impact on industrial exports, making them less competitive, and affects therefore more negatively the regions dependent upon industrial exports and less negatively the regions specialised in services. • Negative impact on growth in all European regions; • Most negative impact on eastern countries, especially those bordering the EU-15; • Lower negative impacts (East and West) on capital city regions and some agglomerated regions more dependent on services; • Stronger negative impacts on regions dependent upon agriculture and manufacturing; • Peripheral areas are generally less affected because of their lower exports of industrial goods

	Role of the ECB: Devaluation of the exchange rate	Devaluation of the exchange rate favours exports, making them more competitive, especially the regions the economy of which is highly internationalised. • Positive impacts in all countries and regions, but much stronger in the West of Europe than in the East because of stronger exporting capacity; • In the West, all capital city regions are less positively affected (service economy), while the regions around the MEGAs and capital city regions (industrial economy) register the highest positive effect; • Devaluation affects positively more the regions primarily specialised in labour-intensive, tradable and higher price-elasticity industrial activities, highly concentrated outside agglomerated regions or in specialised industrial areas; • The economy of mega and agglomerated regions is in general more dependent on public services and less positively affected by devaluation.
Economic integration	**Single Market programme**	To the question whether economic integration (Single Market) affects the regional disparities in Europe, there is no clear answer, neither in theories nor in empirical evidence. • Economic integration is supposed to increase regional specialisation when production structures change due to the comparative advantages, accompanied by convergence in factor and product prices. The economic activity is supposed to be dispersed across regions (neo-classical trade theory); • Geographic concentration/dispersal is conditioned by centripetal forces (market size effects, thick labour markets, external economies) and centrifugal forces (immobile production factors, land rents, external diseconomies);

		• Very high transportation costs are an obstacle for competition in the markets because their make trade more difficult; • Immigration of labour force causes production increases but also price competition effects; • Agglomeration forces create clusters of industries with increasing returns to scale; • The impact of integration on specialisation may be counteracted by general structural changes (decline of agriculture and manufacturing and increase of service activities); • Empirical studies generally do not confirm the theory of economic specialisation at regional level in the context of European economic integration. This may result from still high transaction costs (language and culture barriers). It is possible that in future stronger specialisation of economic activities takes place in Europe, when the Single Market has really become effective, as in the case of the USA.

EU policy: R&D, technological development[6]

Main policy area	Measures	Causality of territorial impacts
R&D, technological development, Lisbon Strategy	R&D Framework Programme	• The generation of new knowledge through R&D remains at the heart of the innovation process. Innovation is however an intensely social process and is dependent upon the social and cultural context in which it takes place. The absorptive capacity of a region depends upon: the available knowledge infrastructure (universities, research institutes and science parks), the skills of the resident population, the financial system, the networks of exchange within a region, the network of intermediary institutions. • The accumulation of knowledge generates increasing returns. Regions with strong R&D endowments are also likely to attract more these factors, establishing strong processes of cumulative causation. Those regions that do not have existing endowments may continue to lag behind and may indeed see the gap with wealthier regions widen. EU R&D policies can reinforce existing concentrations of activity and so potentially adversely affect spatial balance (reinforcement of existing clusters of activity). • EU R&D policies are demonstrably impacting on the spatial geography of R&D across the EU in a number of ways. Chief amongst these are the effects of making connections between firms and research bodies across the EU and the strengthening of the capacity of individual regions to participate in research and innovation activities. • At the EU level the Framework Programmes are having a significant influence on stimulating the development of a European Innovation System through promoting linkages between researchers and companies located across the Union. The

6 Cf. ESPON Project 2.1.2 'The territorial impact of EU research and development policies', Final Report, 2005.

		potential that these transnational networks offer in terms of wider spillover effects within home regions is substantial. However, current evidence suggests that the effects of this are in practice more limited. • On first sight the distribution of projects funded by the Framework Programmes appears to counteract territorial cohesion objectives, as economically stronger regions tend to have a larger number of firms and research organisations engaged in Framework Programme activities. However, closer analysis demonstrates that when economic strength is controlled for, and more particularly levels of R&D expenditure, many less favoured regions benefit disproportionately from the Framework Programmes. • The Framework Programmes are contributing in a significant manner to the widening of the European research space. Whilst there is a recognised concentration of R&D activity in the core of the EU and the northern periphery the Framework Programmes provide a mechanism for institutions and enterprises in less favoured regions to participate in high level European research projects. • The role of the Framework Programmes in supporting projects that bring new knowledge and experience into a region is important, so contributing to the building of future research and innovation capacity. • the benefits of Framework Programme participation are often highly concentrated within regions (main cities), and the knowledge may be principally retained by the project participants themselves (intellectual property rights, patents). • Whilst the overall impact that EU R&D policies have had on the territorial balance of the European Innovation System is admittedly limited, it would be

		wrong to underestimate the gains that have been made. EU R&D policies (including the contribution of Structural Funds) have contributed to the development of stronger innovation systems in a number of less-favoured regions where the innovation systems were previously weak. The spatial balance of EU R&D policies is also supportive of spatial objectives such as the promotion of territorial cohesion, although, this has to be balanced with what is sometimes seen as a competing objective of stimulating the competitiveness of the EU economy as a whole.

EU policy: TRANSPORT

Main policy area	Measures	Territorial impacts
TEN-T	Financial support to the development of major transport infrastructure	• Improvement of accessibility of areas concerned, especially of nodes and access points to the networks • Contribution to the economic development of remote or congested areas; • Possible de-congestion of secondary networks and therefore improvements of local accessibility and of local environment; • Possible reduction of the relative accessibility of areas crossed but not services by TEN-T (tunnel effect); • Possible pressures on natural areas and environmental degradation in built-up areas.
Liberalisation	Suppression of constraints in terms of access to transport markets	• Price decrease of transport services caused by stronger competition and therefore positive economic impacts on the regions concerned, especially those where transport demand is strong; • Possible decline of transport services (frequency; quality) in areas with low transport profitability (low density, more remote regions); possible decline of services of general interest; • Positive impacts on regions where transport businesses concentrate because of low wage costs or other competitive factors; • Negative impacts on countries and regions where the transport businesses were weakly productive but strongly protected; • Improvement of the accessibility of a number of

		less developed regions through regional airports and low-cost airlines; • Possible stronger competitiveness of rail freight transport and therefore improvement of the environment through the de-congestion of roads and motorways.
Technological development in transport	Financial support to R&D and technological development, including Intelligent Transport Systems	• Development of less polluting vehicles (fuel-saving engines, hybrid cars, fuel cells engines) and related improvement of the environment, especially in cities; • Development of energy-saving transport generating economic improvement in regions with high transport intensity or in more peripheral regions; • Development of intelligent transport systems increasing the transport efficiency (economic benefits), reducing congestion through better traffic guidance (environmental and economic benefits, especially in urban regions), reducing risks through better tracing of hazardous goods (improvement of the living environment).
Sustainable transport	Road pricing	• Modal shift in favour of more environmentally-friendly transport modes and thus improvement of the environment; • Possible traffic diversion towards roads on which road pricing is not applied (traffic increase on secondary networks; transnational traffic diversion in border regions); • Possible economic constraints for regions the economy and accessibility of which is highly dependent upon road transport (especially

	Norms, legislative measures, financial support	• Improvement of the quality of life, especially in cities; • Reduction of mobility needs through ICT services; • Increase of accessibility for specific population groups through the development of public transport.
Increase of transport security	Norms and legislative measures	• Decrease of the number of accidents and injuries, especially in urban areas; • Increase of security and quality of life in cities

5 TEQUILA

Introduction

On the basis of all the above accumulated knowledge and policy objectives, the team from the Politecnico de Milano, under the leadership of Roberto Camagni, has developed a concrete model for estimating territorial impacts. The structure of this model is universal and can, therefore, be used even if the policy objectives against which policy are to be assessed change. The concrete implementation example is based on a proposed operationalisation of the concept of territorial cohesion.

This chapter presents the political and scientific basis and functioning of the model as well as a practical application for the assessment of the impact of TEN policies.

5.1 Territorial Impact Assessment: the institutional commitment

The need to develop a consistent methodology for TIA emerged during preparation of the ESDP documents, 1995-1999. The final ESDP draft, approved by the Ministers of Spatial Planning in 1999 (CMSP, 1999), refers to TIA in many respects, and in particular in cases where a difficult balance must be struck among different preference or decision dimensions. In the sphere of transport policies, confronted with an accessibility/environment trade-off but also with the challenge of a spatially equilibrated infrastructure endowment and provision, the draft states: 'Comprehensive integrated spatial development strategies' are needed, and 'in the future, *territorial impact assessment* should be the basic prerequisite for all large transport projects' (par. 109). In the sphere of natural resource management, where a wise balancing of protection and development is required: 'The conservation and management of natural resources call for appropriate integrated development strategies and planning concepts as well as suitable forms of management. This ensures that nature conservation and the improvement of living conditions of people are taken into consideration equally. *Spatial and environmental impact assessment* can provide the necessary information basis for this' (par. 138). In the sphere of water resource management, where surface and ground water policies should integrate with preventive measures for the reduction of waste water and careful spatial and land use planning: 'The impact of large water exploitation-related projects should be examined through *territorial and environmental impact assessment*' (par. 145). In all these three cases, TIA is recommended explicitly in the policy options paragraphs (policy options nos. 29, 42, 52), and in a final recommendation: 'Member States should intensify the exchange of experience on *territorial impact assessment*' (par. 185).

The commitment to developing a coherent methodology for TIA was reiterated at the Informal Ministerial Meeting in Tampere, September 1999, with the *ESDP Action*

Programme. Three Strands of Action were decided, and within the first strand, centered on the promotion of 'a spatial dimension in Community and national policies', the action concerning *Territorial Impact Assessment* states: '*The development of a common concept for territorial impact assessment (TIA) is necessary to support spatial development policies. The concept shall be of a cross-sectoral nature and include socio-economic, environmental and cultural indicators for the territory in question*'. Three features should be stressed: the fact that no common concept exists at present; the multisectoral nature of the methodological approach; the fact that impact should refer to specific territories, those addressed by development policies, and not just to the general EU territory.

Along similar lines, in 2002 the Commission introduced a new Impact Assessment (IA) procedure designed to contribute to the more coherent implementation of the Sustainable Development Strategy through assessment of the potential impact of policy options (CEC, 2002), subsequently applied to a number of Commission proposals. Impact assessment is conceived as 'a set of logical steps which structure the preparation of policy proposals' at the European level (CEC, 2005, p. 4), cutting across and integrating different sectors and dimensions (economic, environmental and social) and replacing all previous single-sector type assessments (environmental, gender, business, health assessments) (CEC, 2004b). The general goal of integrating the different dimensions on which impacts may be evaluated, going beyond Strategic Environmental Assessment and other mono-dimensional assessment tools, is similar to that pursued by the TIA. The main difference regards the aggregate perspective in terms of territorial impacts of IA, because its main level is comprehensive and Europe-wide, with indications only of differential impacts on specific typologies of regions (e.g. urban/rural) (CEC, 2004b, p. 11), while TIA should apply to both the general and the specific territorial level.

5.2 The TEQUILA model: a proposed TIA methodology

The foregoing discussion can be used as the basis to propose an operational model for Territorial Impact Assessment which comprises the following characteristics:

A. The TIA methodology should enable integrated assessment of the territorial effects of policies, programmes and broad integrated projects at different spatial levels, in particular the general EU level and the regional one;

B. The TIA methodology must necessarily link with given policy concepts.
C. TEQUILA is a Multicriteria Model; given the multiplicity of the 'dimensions' of territory, this well-known assessment approach seems the most appropriate. The different dimensions of the policy goals and their sub-components become the *criteria* in the assessment model;

D. The *weights* of the dimensions and sub-components are defined in a multiple and flexible manner through internal expert discussion, discussion within the ESPON Monitoring Committee or DG XVI, or Delphi inquiries. In principle, they should not vary with respect to the policies analysed. Assessment experiments should be conducted to test the sensitivity of the results to change in weights;

E. The general impact of EU policies on each dimension/criterion should be defined using ad hoc studies and/or expert judgements. Cause/effect relations should be carefully inspected; This phase allows for a large diversity of methods to be used.

F. The method accommodates, in consistent and statistically sound manner, both qualitative and quantitative impacts (see point K). Qualitative impact scores are attributed on a +5 to -5 scale:

5= very high advantage for all;
4= high advantage for all;
3= high advantage for some, medium advantage for all;
2= medium advantage;
1= low advantage;
0= nil impact;
-1= low disadvantage;
-2= medium disadvantage;
-3=high disadvantage for some, medium disadvantage for all;
-4 high disadvantage for all;
-5= very high disadvantage for all.

G. The TEQUILA model furnishes a first *General Assessment* (GA) of the impact of EU policies on the overall European territory (1st layer). This assessment refers to a general, abstract territory, and the impact on each criterion (c) may be seen as a 'potential impact' (PIM):

$GA = \Sigma c\ \theta c\ .\ PIMc$ where

θc = weight of the c criterion
PIM = potential impact of policy (abstract)

A General Assessment (GA) is performed for each of the defined policy dimensions. An overall GA can then be performed, provided that the relative weights of the dimensions are defined.

H. The preceding 'general' assessment must be made truly 'territorial' by considering the specificities of the single European regions, given that:

- the *impact* may differ according to regional specificities
- the *intensity* of the policy application may be different in different regions
- the *relevance* of the different 'criteria' of the assessment method is likely to be different for different regions (e.g.: the same increase in income has a different significance according to the development level already achieved by an individual region)
- a region may not be subject to a specific policy.

I. A *Territorial Impact* model is built to assess the impact on single regions r (2nd layer). It is designed to be simple, operational and relatively user-friendly:

$TIM_r = \Sigma_c \theta_c . S_{r,c} . (PIM_c . PI_r). PA_r$

TIM = territorial impact (for each dimension)
c = criterion of the multi-criteria method
r = region
θ_c = weight of the c criterion — $0 \leq \theta_c \leq 1$; $\Sigma_c \theta_c = 1$
$S_{r,c}$ = sensitivity of region r to criterion c — $0 \leq S_{r,c} \leq 1$
PIM = potential impact of policy (abstract) — $-5 \leq PIM_c \leq +5$ (in qualitative analyses)
PI = policy intensity (in region r)
PA = policy applicability (a 0/1 variable)

J. The rationale for the previous equation is the following: as in risk assessment, where *risk = hazard* (potential risk) x *vulnerability*, here the territorial impact is the product of a *potential impact* (PIM) times a *sensitivity* indicator. In its turn, Sr,c is a vector (weighted sum) of regional characteristics defining two main elements: *vulnerability/receptivity* to impact (mainly geographic indicators)[7] and *desirability* of the dimension/criterion (technically a utility function, mainly socio-economic indicators) of region r:

$S_{r,c} = V_{r,c} . D_{r,c}$

K. The term ($PIM_c . PI_r$) in the equation is the equivalent in the qualitative scoring of a quantitative impact assessed using a quantitative external model (e.g. the impact of transport policies on regional accessibility). In this latter case, as quantitative impacts are defined in their own specific measurement units and scales, they are translated into a value score on the +5 /-5 scale. Two different methods may be used: assigning to the +5/-5 (or 5/0) scale respectively the maximum and minimum *expected* or *likely* values ('global scaling') or the maximum and minimum values *currently obtained* ('local scaling'). A third method is also suggested, similar to 'global scaling'. This we may call 'ad hoc scaling' and is more consistent and transparent in the present statistical framework: assigning the current

[7] Vulnerability refers to negative impacts; receptivity or 'absorptive capacity" to positive impacts.

values of the impact to a restricted scale defined within the abstract +5/-5 scale according to a subjective judgement on the absolute importance of the impacts assessed. In fact, these impacts on the single regions may well belong to a small 'qualitative' interval, and it would be unwise to assign them to a scale ranging from an absolute minimum to an absolute maximum (Fig. 3)[8]. As the choice of scaling methods engenders an implicit weighting of the criteria, this should be as transparent as possible, and be part of the political process accompanying the application of the model.

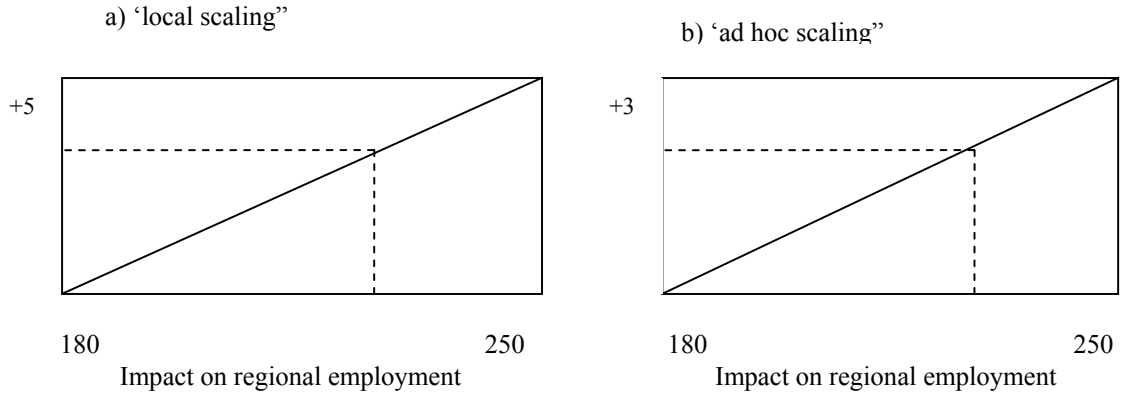


Figure 1 Alternative scaling from quantitative to qualitative assessment

L. Some of criteria/subcriteria of the policy goals are activated only when certain kinds of policy proposals are considered; others are activated only in the General Assessment model, and not in the territorial one, because they refer to interregional conditions (integration,

[8] In Fig. 3, the same impact of a policy proposal on employment in the different European regions could be translated into the +5/0 scale (positive impact) by assigning the minimum and maximum values respectively to 0 and +5, or, more wisely, given the proximity of values and the reduced size of the impact distribution, to a proper, subjectively defined, +3/+2 scale. In this case, the arithmetic of the exercise is the following:

$$y_i = y_{min} + (y_{max} - y_{min}) \frac{x_i - x_{min}}{x_{max} - x_{min}}$$

where :

y_i = score on the (continuous) qualitative scale

y_{min} = minimum value of the qualitative scale (defined by the evaluator)

y_{max} = maximum value of the qualitative scale (defined by the evaluator)

x_i = value of current impact

x_{max} = maximun value of current impact (quantitative)

x_{min} = minimum value of current impact (quantitative)

disparities, etc.) (indicated with a * in the list). The list of criteria/objectives should be carefully inspected in order to control for completeness, independence and double counting.

M. The utility or vulnerability functions are treated as functions – linear or non-linear, direct or inverse – of single indicators, according to the nature of the impact: per-capita GDP level (for the desirability of impacts on GDP or on the environment), continuity or relevance of the natural heritage (for vulnerability of the environment), etc. Just as with scaling, these functions should be chosen as transparently as possible and be part of the political discussion accompanying the model application, as the content and shape of each function will obviously influence the overall results.

Depending on data availability, TIM can be performed at Nuts 3 level, and the results easily mapped.

N. In conclusion, the proposed methodology appears as sufficiently user-friendly, theoretically sound and operational.

5.3 Territorial cohesion: the new major objective of the Union

In order to be able to propose a concrete implementation of this TIA methodology, the team first had to define the dimensions and subdimensions (criteria) a policy should be assessed against. It was decided to start from the concept of *territorial cohesion* as the overarching territorial policy objective.

'Territorial cohesion' as a major objective of the Union was proposed by the Commission in February 2004, in its Third Report on economic and social cohesion (CEC, 2004b), and authoritatively relaunched by the draft Constitution of the Union approved by the Council of Ministers at the end of June 2004: '*The Union ... shall promote economic, social and territorial cohesion…*' (article I-3).9

This indication indubitably increases the need for a sound TIA methodology, and the new concept of territorial cohesion should be taken as its main benchmark.

Unfortunately, the concept of 'territorial cohesion' is still somewhat vague and requires clarification and logical consistency. In the Third Cohesion Report, the Commission uses the term as a synonym for 'more balanced development', for 'territorial balance', or for 'avoiding territorial imbalances' (CEC, 2004b, p. 27), elements that do not add much in definitional terms. As a further objective, the Commission states that 'the concern is also to

9 The importance of including this concept is further emphasised by the statement that, in the area of territorial cohesion, the Union has a '*shared competence'* with Member States (art. I-14.2).

improve territorial integration and encourage cooperation between regions', which although an important indication, may be given a secondary ranking in terms of policy priorities.

More telling is the subsequent specification of the aspects encompassed by the new concept at the different territorial levels: excessive concentration of economic activity and population in the European 'pentagon'; an imbalance between the main metropolitan areas and the rest of countries; growing congestion and pollution and the persistence of social exclusion in the main conurbations; the presence of rural areas suffering from inadequate economic links and peripherality; the sprawling nature of urban growth; the accumulation of natural and geographical handicaps in outermost areas.

More thorough treatment of the concept of territorial cohesion has been provided by DG Regio in a subsequent report (CEC, 2004c) devoted specifically to the subject and drawing on the early results of the ESPON program and of other Commission studies. Here territorial cohesion is considered as complementary to economic and social cohesion, meaning 'the balanced distribution of human activities across the Union'; more importantly, 'it translates the goal of sustainable and balanced development assigned to the Union into territorial terms' (CEC, 2004c, p. 3). The subsequent exemplification of the fields of application is similar to that furnished by the main Cohesion Report.

Subsequent policy documents and political statements on the subject have not developed the concept any further. The Presidency conclusions of the Informal Ministerial Meeting in Rotterdam (November 2004), explicitly devoted to territorial cohesion, states in fact that '… territorial cohesion adds to the concept of economic and social cohesion by translating the fundamental EU goal of balanced and sustainable development into a territorial setting' (Dutch Presidency, 2004). Despite the persisting fuzziness of the concept, the reference to a 'territorial setting' allowed Ministers to engage until 2007 in proper identification of '…the contribution of integrated spatial development approaches towards enabling regions and cities to exploit their potentials more effectively': the reference is to a future document on 'the Territorial State of the Union', a second ESDP with a stronger policy emphasis.

The Scoping Document on this new perspective was presented at the Informal Ministerial Meeting in Luxembourg, May 2005 (Luxembourg Presidency, 2005a). The definition of territorial cohesion remained the same, but it acquired a new 'practical' meaning when it was included in a direct policy frame: 'In practical terms territorial cohesion implies: *focusing regional and national territorial development policies* on better exploiting regional potentials and territorial capital – Europe's territorial and cultural diversity; *better positioning of regions in Europe* .....facilitating their connectivity and territorial integration; and *promoting the coherence of EU policies with a territorial impact*....' (p. I; emphasis in the text).

This passage contains a number of significant innovations. First, traditional 'spatial development' policies are called 'territorial', using a neologism in the English language that suggests the exploitation of territorial specificities going beyond pure location and distance in space. Second, the concept of territorial capital is used for the first time, implicitly underlining the fact that territory is a resource that potentially generates productivity increases ('higher return for specific kinds of investment') and utility flows to local communities.

5.4 Territorial cohesion: a theoretical and operational definition

It is our opinion that, if the concept of territorial cohesion is to add to the content of economic and social cohesion, it must necessarily be linked with the sustainability issue. In short, *territorial cohesion may be seen as the territorial dimension of sustainability*. Like the concept of sustainability, it has a positive and a normative connotation at the same time (i.e., it defines a condition and a policy goal) and operates by integrating different dimensions: economic, social and environmental (Camagni, 2005).

The preceding definition may be explained in the following way. Considering both the positive and the normative sides, sustainability conditions and goals refer to four main (policy) dimensions (Camagni, 1998):

- the *technological dimension* governing production processes,
- the *behavioral dimension* determining life-styles, consumption habits and also organizational models of production (e.g. transport intensive models like just-in-time),
- the *diplomatic dimension* referring to international strategies to assure co-operation among countries at different development levels, with different development expectations, and
- the *territorial dimension* residing in an ordered, resource-efficient and environment-friendly spatial distribution of human activities.

We maintain that territorial cohesion refers directly to the last dimension. On elaborating this point further, we can envisage three main components/objectives of territorial cohesion, namely:

- *Territorial efficiency*: resource-efficiency with respect to energy, land and natural resources; competitiveness of the economic system and attractiveness of the local territory; internal and external accessibility;
- *Territorial quality*: the quality of the living and working environment; comparable living standards across territories; similar access to services of general interest and to knowledge;

- *Territorial identity*: presence of 'social capital'; ability to develop shared visions of the future; local know-how and specificities, productive 'vocations' and competitive advantage of each territory.

These objectives may be achieved through an integrated approach which ensures the virtuous integration and positive co-evolution of the three main territorial sub-systems - economic, social and physical-natural - in their spatial manifestation or phenomenology. This means maximizing synergies and positive cross-externalities between each sub-system and all the others, and minimizing negative externalities (Camagni, 1998). The integrated, multidimensional nature of the sustainability concept provides a rationale for an integrated approach to territorial cohesion policies (Fig. 1).

Territorial efficiency, quality, and identity are objectives and values in themselves; no modern society can do without them, for they are the basis of local collective well-being. But at the same time they are preconditions for local competitiveness, and no conflict exists in this sense between the needs of the local population and the needs of the economic system, at least in the long run. This element has been conceptually utilized by recent EC documents in order to justify compliance and consistency between cohesion policies and the Lisbon strategy.

While the first two objectives are rather familiar, the third, namely territorial identity, may be rather surprising. Yet we believe that it is crucial and that it will become increasingly central to European policies. Territorial identities incorporated in local culture, know-how, social capital and landscape are the basic constituents of the territorial realm because they simultaneously:

- represent the ultimate 'glue' of local societies,
- are linked with the spatial division of labour and in many cases determine its evolution,
- facilitate processes of collective learning and consequently boost the efficiency of the local production system (Camagni, 2002).10

Which territorial issues warrant attention in the context of territorial efficiency/quality/identity? They may be found and described particularly in the ESDP, and may be summarized as in Figure 2. Reference to the main ESDP goals is obligatory for any TIA methodology.

10 The already-mentioned Scoping document of the Luxembourg Presidency (2005) indicates natural but also cultural values as part of the endogenous potential of areas that should be fully exploited. To be noted is that the ESDP begins and ends with reference to culture, cultural variety and cultural heritage as characteristic features of the European territorial identity.

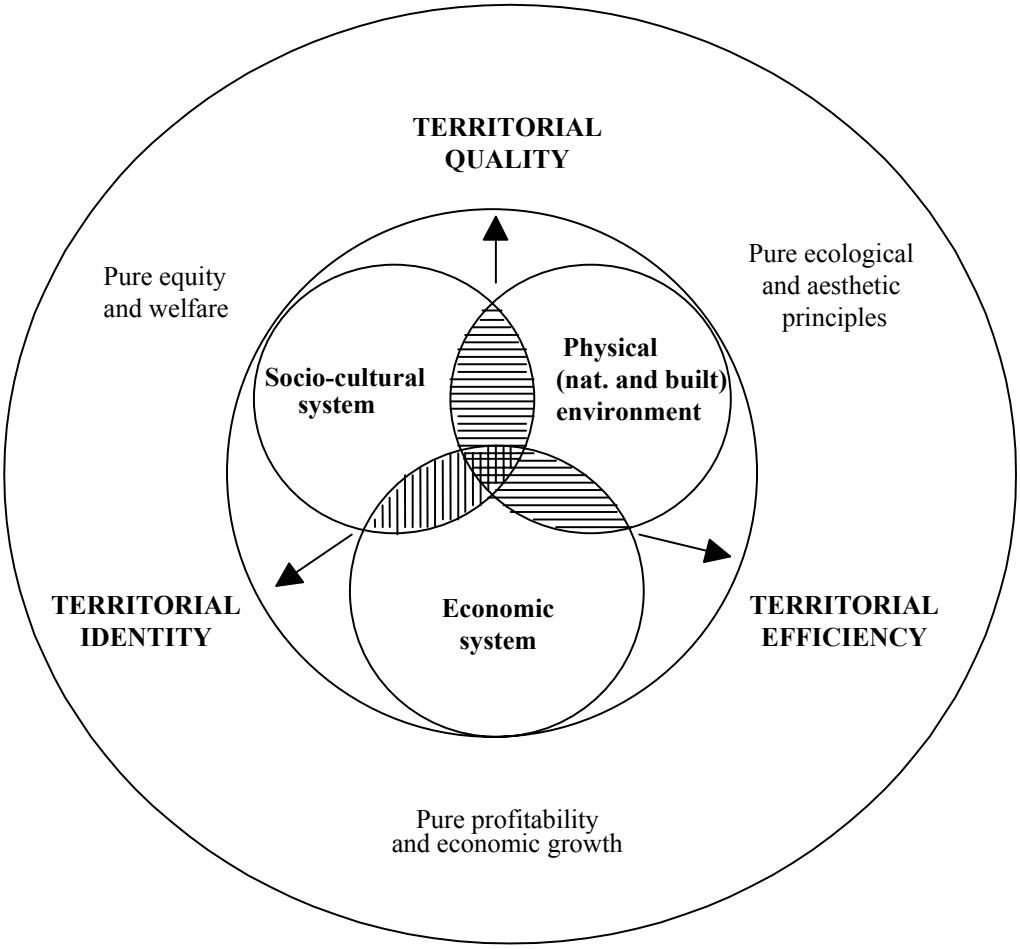


Figure 2 The dimensions of territorial cohesion

Each of the dimension in figure 2 can be broken down into sub-dimension, which we can use as the criteria in the TEQUILA model (see figure 3).

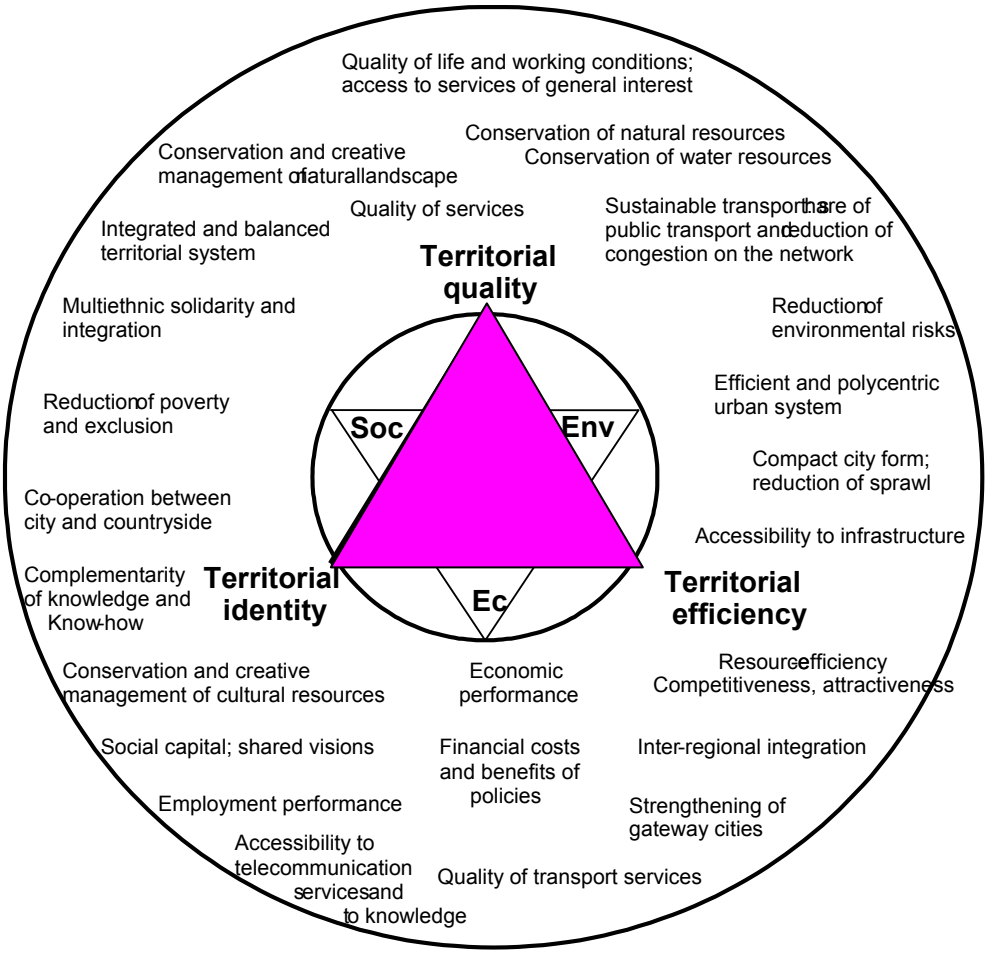


Figure 3 An integrated strategy for territorial cohesion objectives and assessment criteria

Practically, this means that the following criteria should be entered into the TEQUILA model:

Territorial efficiency:

- Efficient and polycentric urban system (*)
- Inter-regional integration (*)
- Resource efficiency: consumption of energy, land, water….
- General accessibility, infrastructure endowment
- Competitiveness of production system
- Sustainable transport: share of public transport and absence of congestion
- Development of city-networks and medium size cities
- Compact city form, reduction of sprawl
- Reduction of technological and environmental risk

Territorial quality:

- Reduction of interregional income disparities (*)
- Conservation and creative management of natural resources
- Access to services of general interest
- Quality of life and working conditions
- Quality of transport and communication services, safety
- Reduction of emissions
- Attractiveness for external firms
- Reduction of poverty and exclusion
- Multiethnic solidarity and integration
- Employment performance

Territorial identity:

- Conservation and creative management of cultural heritage
- Quality of urban and rural landscapes
- Cooperation between city and countryside
- Development of region-specific know-how and knowledge
- Accessibility to global knowledge and creative 'blending' with local knowledge
- Development of territorial 'vocations' and 'visions'
- Development of social capital; shared behavioural rules

The criteria marked with a * can only be measured in the first layer, i.e. the general assessment as they concern the relative situation between regions, and not within regions.

5.5 The Interactive Simulation Package

The methodology indicated in the previous part is utilised to build a prototype, operational model, designed in order to be user-friendly and interactive: **Tequila SIP: Interactive Simulation Package**. The package is subsequently applied to the definition of the territorial impact of TENs policies at NUTS 3 level.

The characteristics of the operational package are as follows.

a. The main criteria of the model are the usual three: Territorial Efficiency, Quality, Identity.

b. For the time being, the model runs with three sub-criteria for each of the preceding criteria.

c. The weights of both the main criteria and sub-criteria may be changed interactively, and results automatically re-computed. The model saves the previous run, presents the results of the last and the previous runs and compares these results in a direct, visual way.

d. The results are computed for both each single NUTS 3 region and for the General Assessment. General Assessment is presented in two forms: as in the formula presented above (weighted mean of general impact on the three criteria) and, more precisely, as a weighted mean of each TIM, the difference residing in the fact that in the latter not just PIMs are considered but also the different sensitivity indicators of each region.

e. In the main presentation sheet (Fig. 4) it is possible to find:
- the weights used for the main criteria in the two simulations (in our case: the 1/3-1/3-1/3 case and a second case with 40% – 40% – 40% weights for each criterion);
- the weights used for the 9 sub-criteria (in this case: 1/3-1/3-1/3 inside each main criterion);
- the quantitative results of the general assessment (in the two ways indicated in point d.);
- the quantitative results of the impacts (the 3 TIMs and the general assessment) in each region, in the last and previous runs; these elements are indicated in tables and in geometric representation (histograms: for the general assessment, the current run is in bold, the previous only in superimposed borders) (Fig. 5 for a better view);
- at the bottom, the buttons for shifting to TIM charts, S functions, PIM functions.

f. The charts for each territorial impact TIM in each region reveal the value of the summative indicator for each region; an arrow allows to point out the value of the single region (its name and score) on the chart (Fig. 6, for TIM Efficiency).

g. PIM functions, i.e. the potential impact of policies on each region, is in general supplied by ad hoc studies. In case it is not, it could be derived as the product of a generalised potential impact times a policy intensity (as seen in the formula for TIM). In the case of the present, pioneering study, only territorialized impacts were utilised, coming from specific ESPON studies. The relative table of the SIP package defines the transformation/normalisation procedure (Fig. 3), already illustrated.

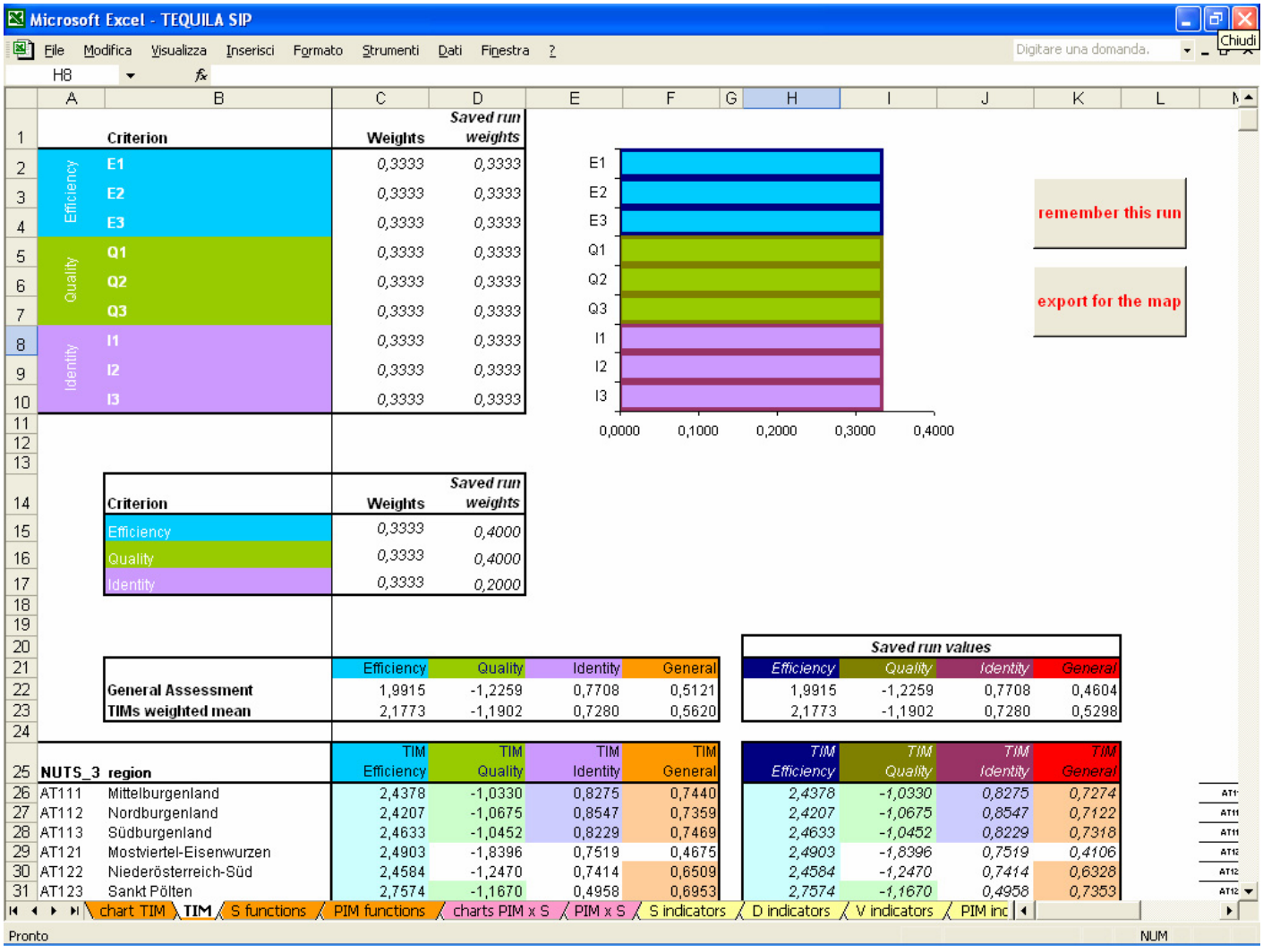


Figure 4 The main presentation sheet: weights and general results

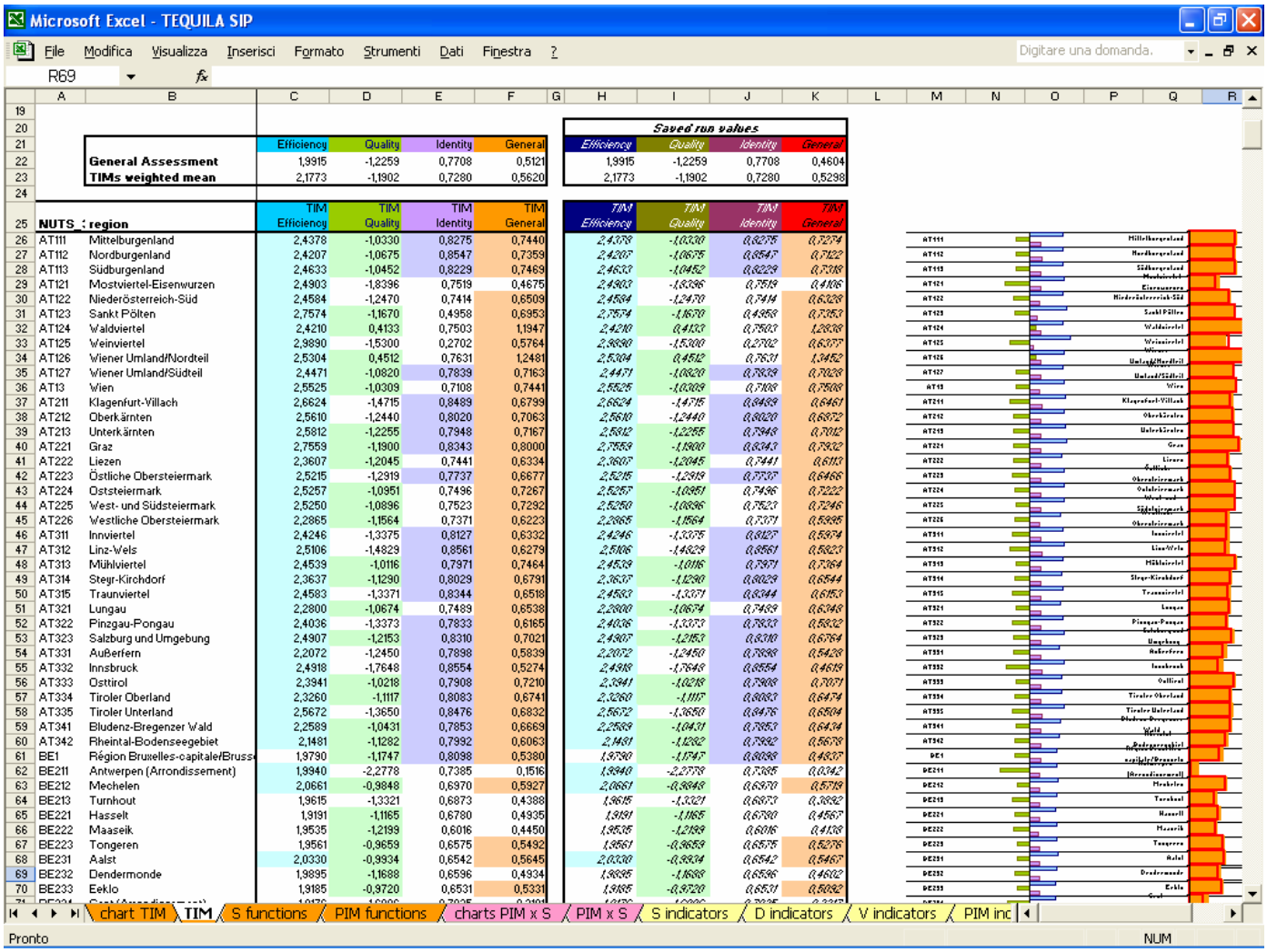


Figure 5 The main presentation sheet: the regional impacts

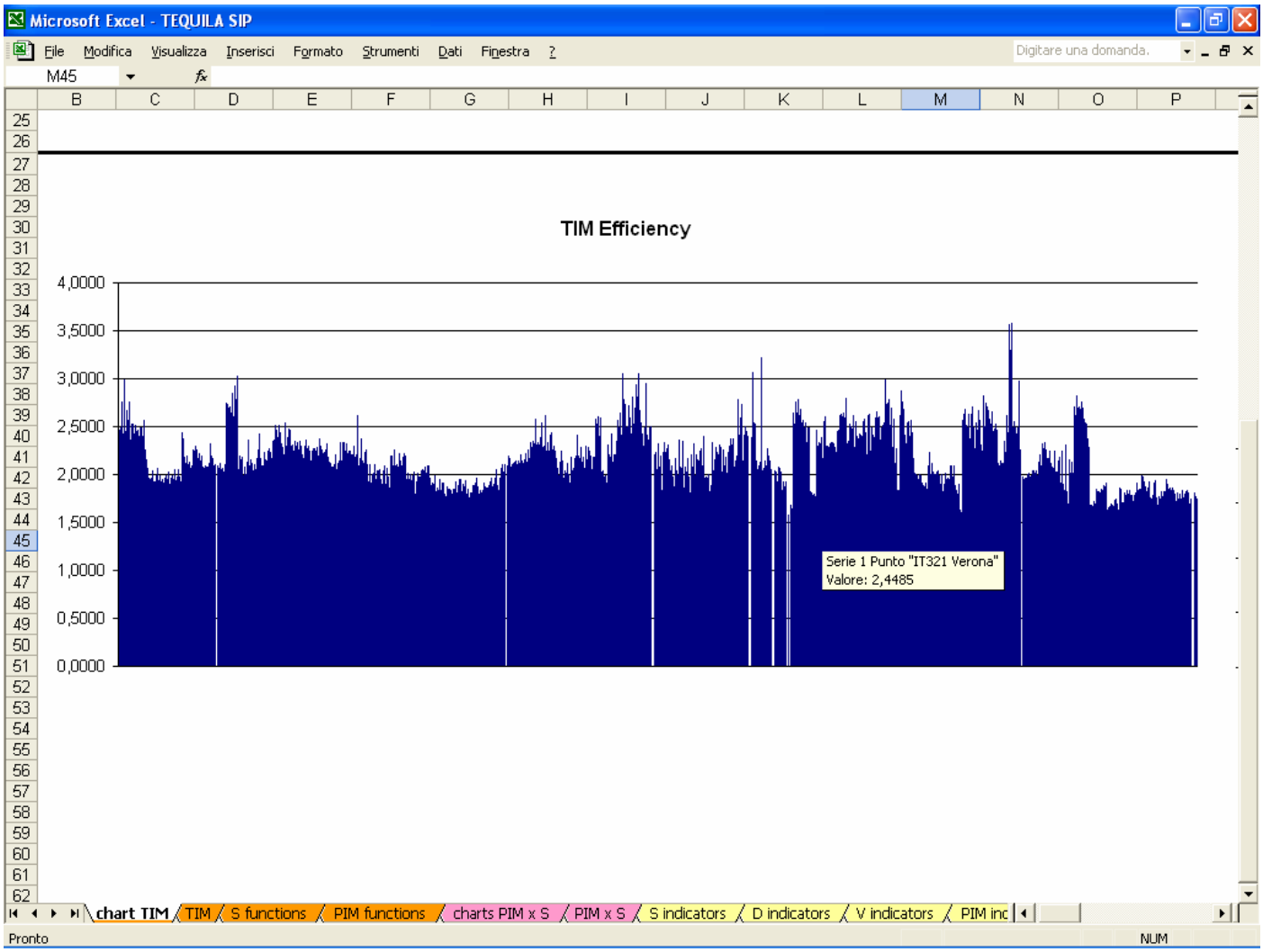


Figure 6 The Territorial Impact chart: Territorial Efficiency

This mechanism supplies the second possibility for flexibility and interactive management of the model, as the normalisation procedure implicitly introduces a second element of 'subjectivity', namely the definition of the normalisation interval. This normalisation can be altered instantaneously, with the complete and automatic visualisation of the new results on all tables. The external intervention may refer to two elements:

- the normalisation interval,
- the for of the normalisation curve (linear or exponential) (Fig. 7)

h. The S functions define, as it was explained before, the sensitivity of each region to each impact. It is generally represented by a vulnerability element (that, in case of positive impacts, may better be called 'receptivity' or 'absorptive capacity': see footnote 3). In some cases the vulnerability element is coupled with an indicator of 'desirability' representing the utility function connected with the specific impact. E.G.: an impact on local income may be differently important in a rich or a poor region, so the utility function is supposed to be negatively correlated with local per-capita income. Examples of S and D functions are

presented in Fig. 8 and 9, always indicating the chart of the original values of the indicator, the normalisation limits and the form of the normalisation function. In these cases the interval utilised ranges around unity as these indicators do not reveal impacts (PIMs) but only vulnerability and desirability of impacts in the single regions.

The Figures presented for PIM, S and D functions are only illustrations of the internal working of the package: they refer to single indicators randomly chosen.

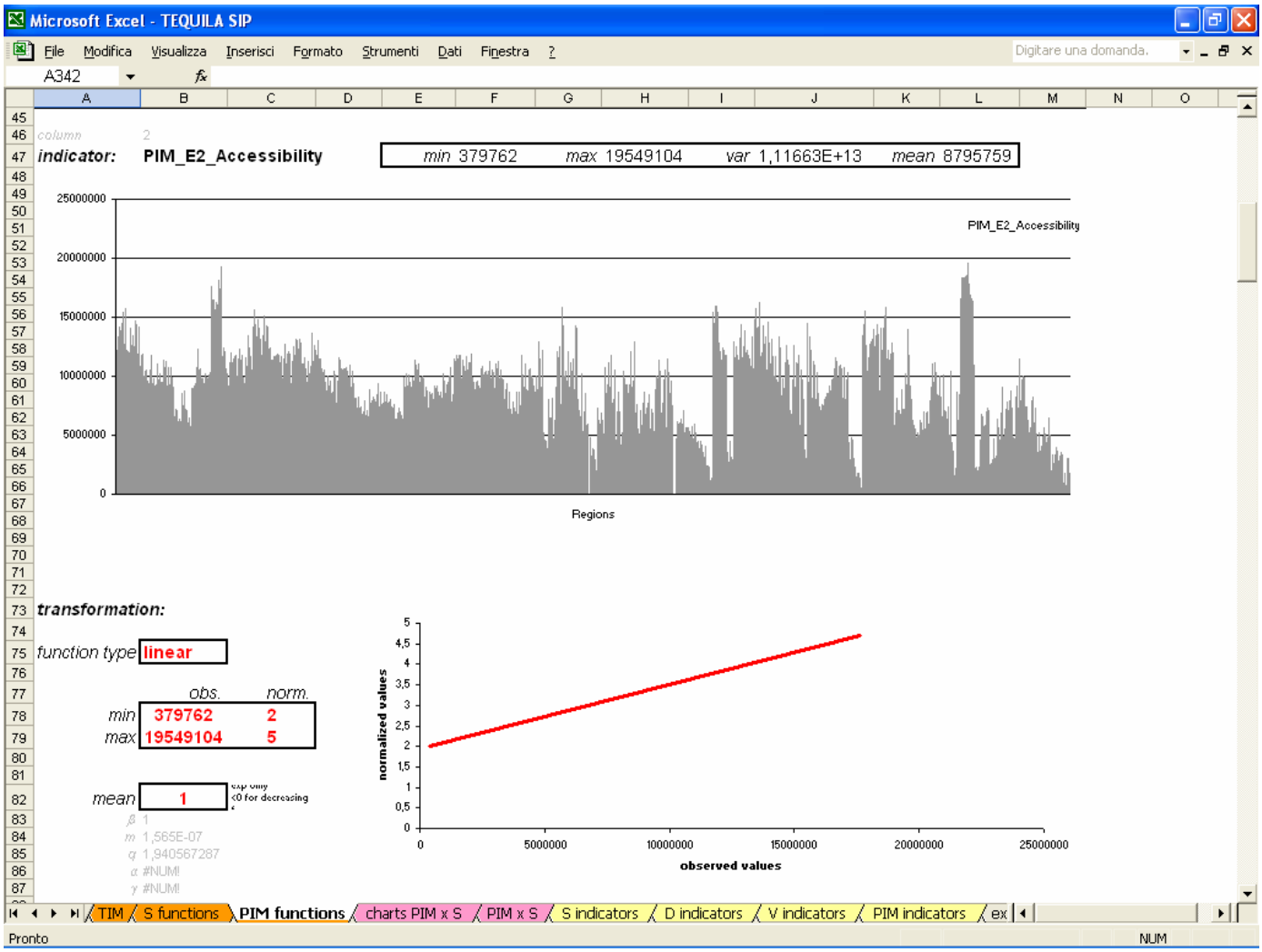


Figure 7 Potential impacts on regions (PIMs)

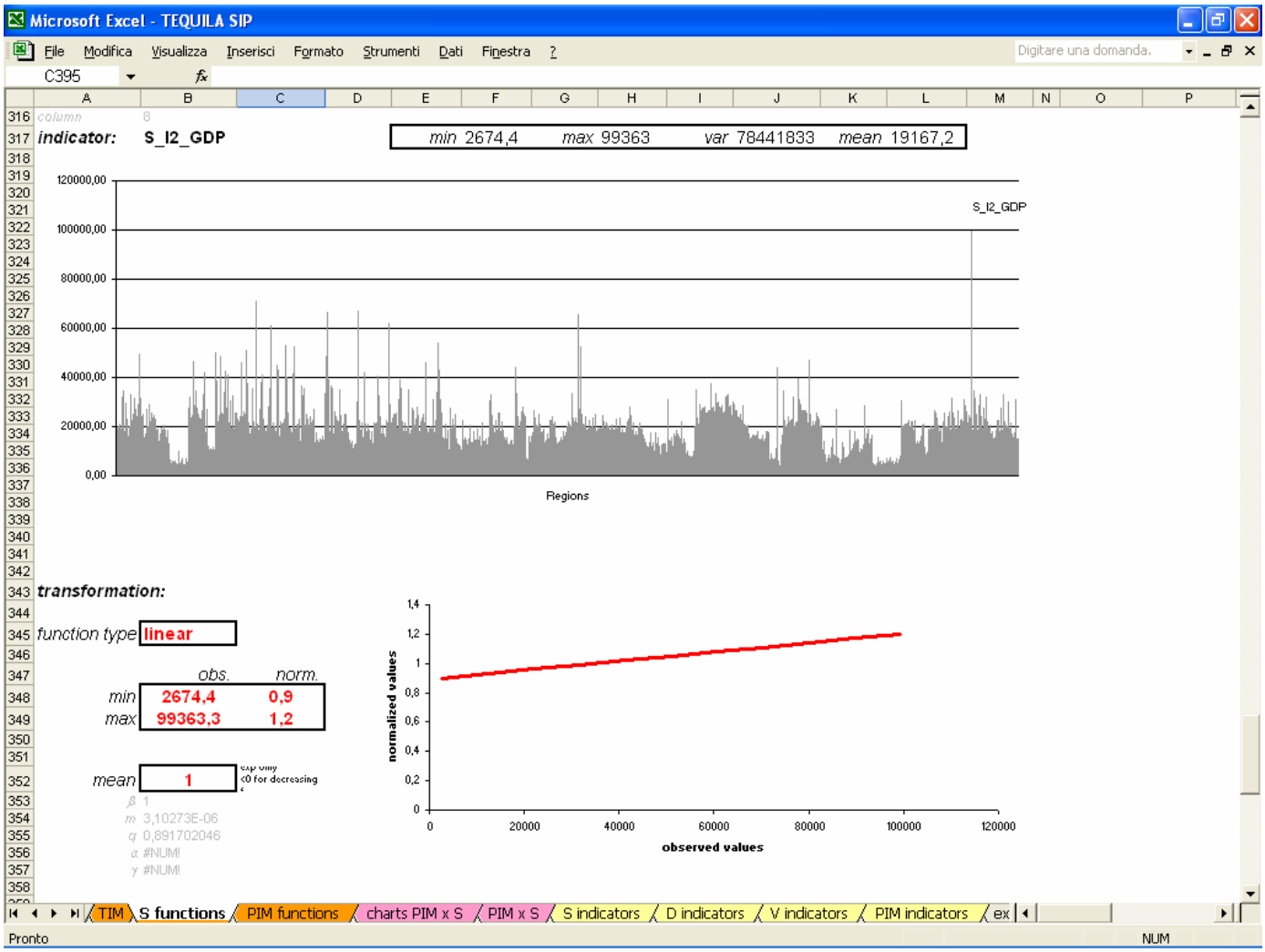


Figure 8 Sensitivity to impacts in regions (S)

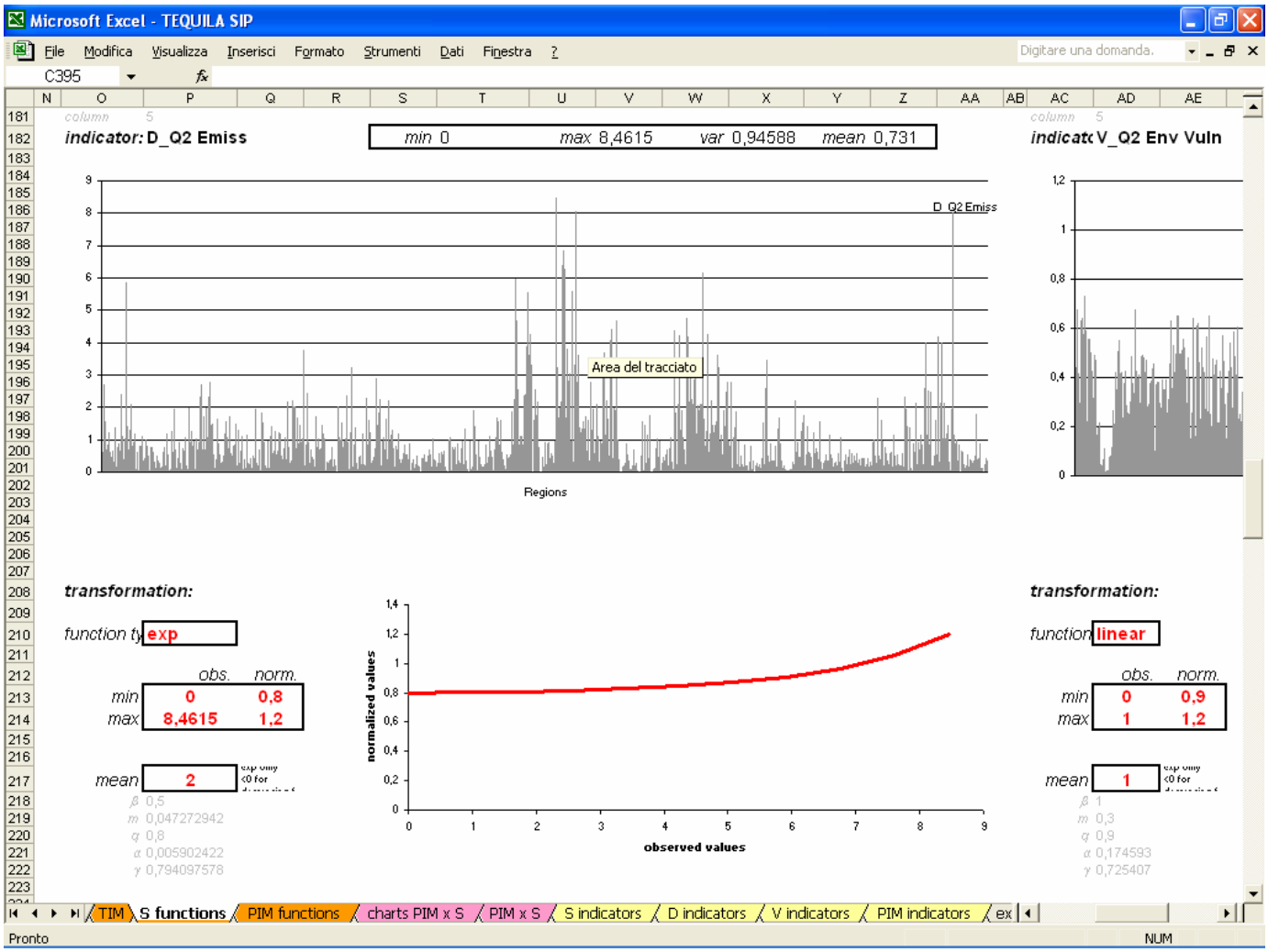


Figure 9 Desirability of impacts in regions (D: utility function)

5.6 An experimental application of the operational model on Trans European Networks policy

It was agreed with the ESPON Monitoring Committee and Coordination Units that a tentative, pioneering application of the methodology for TIA assessment should be applied to a relevant EU policy, namely transport policy and TENs policy in particular. The field appears extraordinarily favorable, as many studies were explicitly carried out inside ESPON on the subject.

As said before, in this particular application, the definition of the single impacts of TENs comes from previous existing studies, in particular:

- ESPON 1.2.1., analyses by MCRIT, Barcelona
- ESPON 2.1.1., results of the SASI model by Spiekermann-Wegener, Dortmund
- ESPON 3.2., analyses by MCRIT, Barcelona.

Variables for the computation of specific impacts (e.g. on identity variables) or vulnerability and utility indicators were taken from the data base of other ESPON studies as:

- ESPON 1.3.3, for cultural heritage indicators, University of Venice,
- ESPON 1,3,1 for natural heritage indicators, GTK,
- ESPON 3.1. for various indicators, BBR, Bonn.

To all the above-mentioned research institutes goes our gratitude for prompt and accurate co-operation.

The scenario on which the assessment is run is the B1 scenario of ESPON 2.1.1., namely the impact of priority projects. This scenario is similar, and judged as comparable, to the 'competitive' scenario defined inside ESPON 3.2, namely a scenario in which only profitable links and networks are built.

Each of the main criteria of the assessment methodology encompasses three sub-criteria, namely:

Territorial Efficiency:

- internal connectivity,
- external accessibility,
- economic growth;

Territorial Quality:

- congestion,
- emissions,
- sustainability of transport services;

Territorial Identity:

- creativity,
- cultural heritage,
- quality of landscape.

The variables (and the relative sources) through which the impact on these sub-criteria are measured are listed in Fig. 10. By the same token, the variables utilized in order to compute the sensitivity indicators and their components (vulnerability, receptiveness and desirability) are presented in Fig. 11, together with their respective sources, variability field and functional shape.

The three complex territorial impacts (TIM on territorial efficiency, quality and identity) were computed under two weight systems; the results are indicated in Fig. 4. On a 1-to-5 scale, territorial impacts are represented by the following summative indicators:

- + 2,17 on territorial efficiency,
- - 1,19 on territorial quality,
- + 0,73 on territorial identity,
- + 0,56 as an overall impact encompassing the three dimensions.

Giving a lower weight to territorial identity measures (20% instead of 33%) does not change much the general result: + 0,52.

5.7 Main results of the experimental application of TEQUILA on TEN policies

The single results on each European region are mapped in Fig. 12 to 14 (equal weight case). We can see in particular:

- the highest gains in territorial efficiency are situated in a long north-south belt encompassing western regions of New Member countries; north-eastern, central-Adriatic and southern-Tyrrhenian Italian regions; but also all NUTS 3 regions in the Iberia peninsula located on a large belt Lisbon-Madrid-Barcelona;

- the lowest impacts in territorial efficiency are to be found in north western French regions, United Kingdom, Ireland and northern Scandinavian regions;

- the (negative) impacts on territorial quality are maximal in some already congested axes (Paris-Lille, the Rhone valley, Barcelona-Valencia-Murcia, London-Liverpool, Bologna-Verona) and in some 'sensitive' territories like some Alpine regions (Trento, Bolzano, Tyrol), some Pyrenees regions and some relatively untouched central-Italian Regions (some provinces in Umbria and Tuscany);

- interestingly enough, there exist also some positive impacts on territorial quality, thanks mainly to a potential shift towards more sustainable transport means: in the already mentioned axis from Lisbon to Barcelona, in most of German regions, in many scattered regions in New Member Countries;

- the impact on Territorial Identity is mainly positive, as TENs will enhance visibility and potentialities of local cultural and natural specificities: this effect is evident in particular in some New Member countries (Czech Republic, Slovakia, Hungary) and in western Ireland. Some negative impacts do exist though, linked to the possible increasing fragmentation of landscapes;

- the general territorial impact is generally positive, but particularly positive in some territorial belts: the western regions/countries among New Member states and the east-west belt in central Spain and Portugal.

5.8 Next steps

The tentative, pioneering application of the newly built methodology for territorial impact assessment has produced, in our opinion, acceptable and even convincing results.

Further steps are needed in order to strengthen the operational part of the methodology and test the sensitivity of the methodology to wider changes in the definition of weights, normalization procedures and regional utility functions.

Major advancements could be achieved in the following directions:

a. widening the sensitivity analyses, as said,

b. widening the array of variables utilized inside each sensitivity/desirability indicator,

c. widening the number of sub-criteria inside each of the three main criteria,

d. utilizing the methodology also in cases where direct impact studies are not available,

e. utilizing the methodology for other variants of the TENs or transportation policies,

f. utilizing the methodology for other policy studies.

	Potential Impact		Description	Unit of measure	Direction	Variation	Weight	Source of data
Efficiency	PIM_E1	Internal connectivity	Dif transport endowment (road + rail)/GDP	Km / Km2	+	0 to 4	0,333	Mcrit
	PIM_E2	Accessibility	Dif accessibility (road/rail passenger travel), scenario B1 (only priority projects)	Number of people	+	2 to 5	0,333	ESPON 1,2,1 Mcrit
	PIM_E3	Growth	Dif GDP, scenario B1 – Difference to reference scenario 2000 – 2021	Dif % GDP	+	2 to 4	0,333	ESPON 2,1,1, SASI Model SCENARIO B1
Quality	PIM_Q1	Congestion	Dif-flows, baseline scenario 2015	Million Vehicles/Km	-	2 to -5	0,333	Mcrit
	PIM_Q2	Emissions	Dif CO2 emissions baseline	Million Tons CO2 / Year	-	2 to -5	0,333	Mcrit
	PIM_Q3	Transport sustainability	Dif rail - Dif road, baseline scenario 2000-2015	Km /Km	+	-3 to 3	0,333	Mcrit
	PIM_I1	Creativity	Dif accessibility*[knowledge services]	(# people)*(density libraries + theatres)	+	1 to 4	0,333	ESPON 2,1,1, SASI Model SCENARIO B1; ESPON 1.3.3
Identity	PIM_I2	Cultural heritage	Dif accessibility*[# monuments-museums]	(# people)*(# monuments + museums)	+	1 to 4	0,333	ESPON 2,1,1, SASI Model SCENARIO B1; ESPON 1.3.3
	PIM_I3	Landscape	Dif. Transport endowment (road+rail) / GDP	km	-	0 to -4	0,333	Mcrit

Figure 10 Indicators of Potential Impact (PIM)

	Sensitivity	Sensitivity parameters	Unit of measure	Variation	Function shape	Source of data
Efficiency	S_E1	D = LOG of current density of transport endowment [density=(road+rail)/GDP] R = 1 S = D norm	LOG[km road-rail/Area NUTS 3]	0,8 to 1,2	Linear	Mcrit
	S_E2	D = LOG [current accessibility] R = 1 S = D norm	LOG [# of people daily accessible by car]	0,8 to 1,2	Non Linear	ESPON 2,1,1 SASI Model SCENARIO B1
	S_E3	D = GDP 2000 PPP per inhabitant R = 1 S = D norm	GDP 2000 PPP per inhabitant	0,9 to 1,2	Linear	ESPON 3.1, Eurostat Regio
Quality	S_Q1	D=Present congestion V=Share of natural areas S= mean of normalised D and V	D= Million Vehicles / network Km V= share of natural areas (Km^2)	0,8 to 1,2 0,9 to 1,2	D = Non Linear V = Linear	Mcrit BBR Corine Landcover
	S_Q2	D=Present emissions V=Share of natural areas S= mean of normalised D and V	Present emissions CO2 year 2000 [million tons] V= share of natural areas (Km^2)	0,8 to 1,2 0,9 to 1,2	D = Non Linear V = Linear	Mcrit BBR Corine Landcover
	S_Q3	D=Present share of railways on total transport network R = 1 S = D norm	Km / Km	0,8 to 1,2	D = Non Linear	Mcrit
I	S_I1	D=GDP 2000 PPP per inhabitant	GDP 2000 PPP per inhabitant	0,9 to 1,2	Linear	ESPON 3.1, Eurostat

		R = 1 S = D norm				Regio
d e n t i t y	S_I2	D=GDP 2000 PPP per inhabitant R = 1 S = D norm	GDP 2000 PPP per inhabitant	0,9 to 1,2	Linear	ESPON 3.1, Eurostat Regio
	S_I3	D=1 V = Degree of natural vulnerability (natural area fragmentation) S= V norm	Natural area fragmentation indicator 1-5: 1= very low; 5 = max fragmentation	0,9 to 1,2	Linear	ESPON 1,3,1; GTK

Figure 11 Indicators of Sensitivity and Desirability

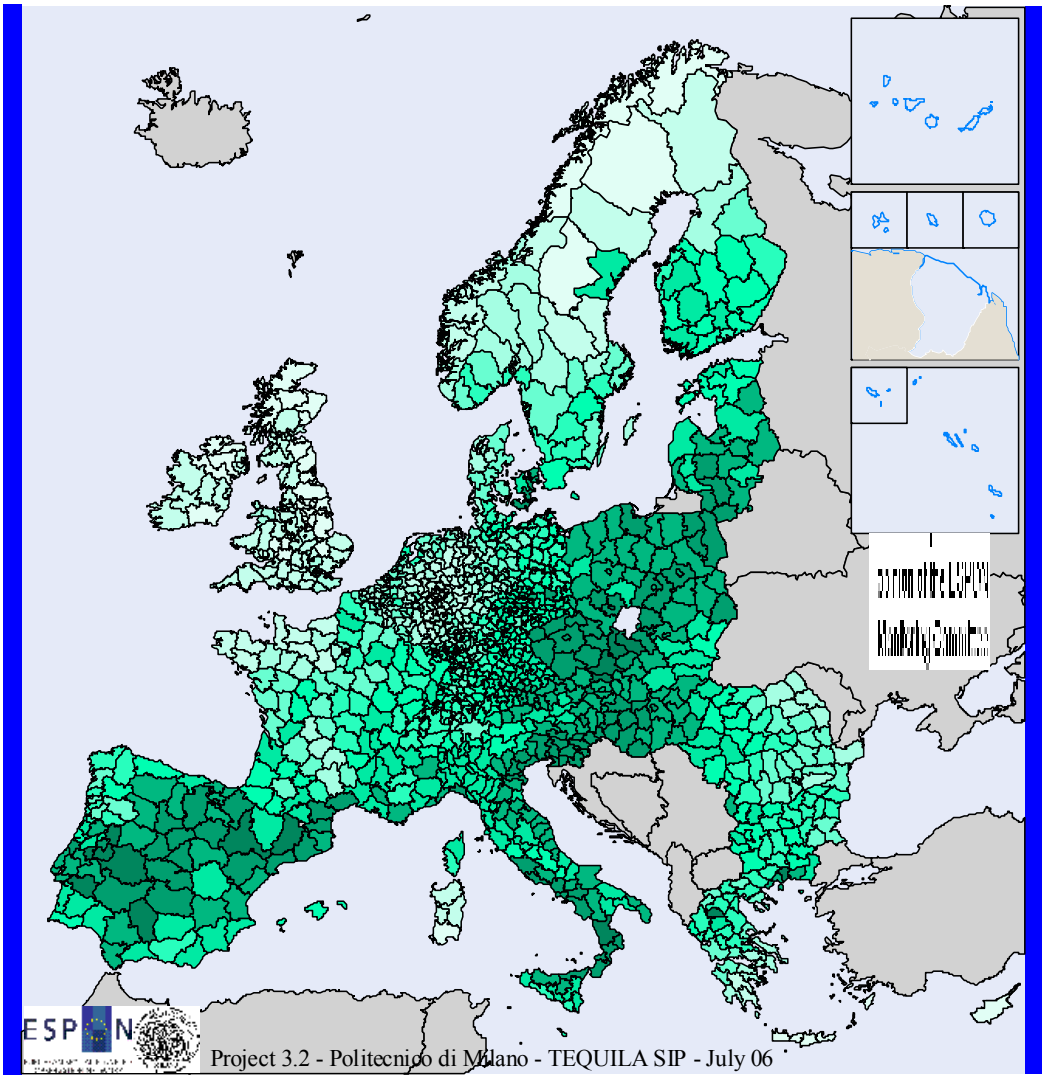


Figure 12 Impact of TEN Policies (priority) on territorial efficiency

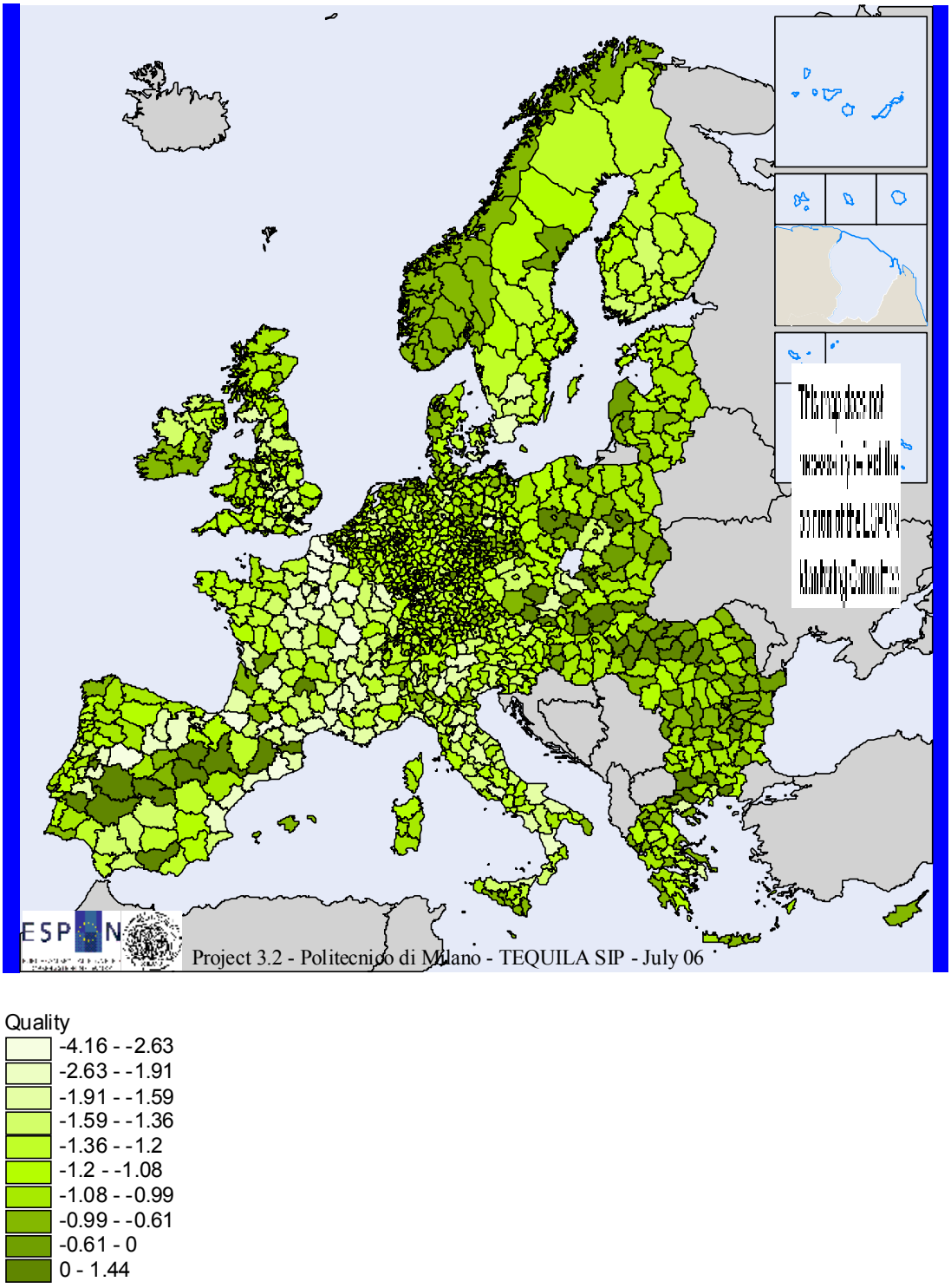


Figure 13 Impact of TEN policies (priority) on territorial quality

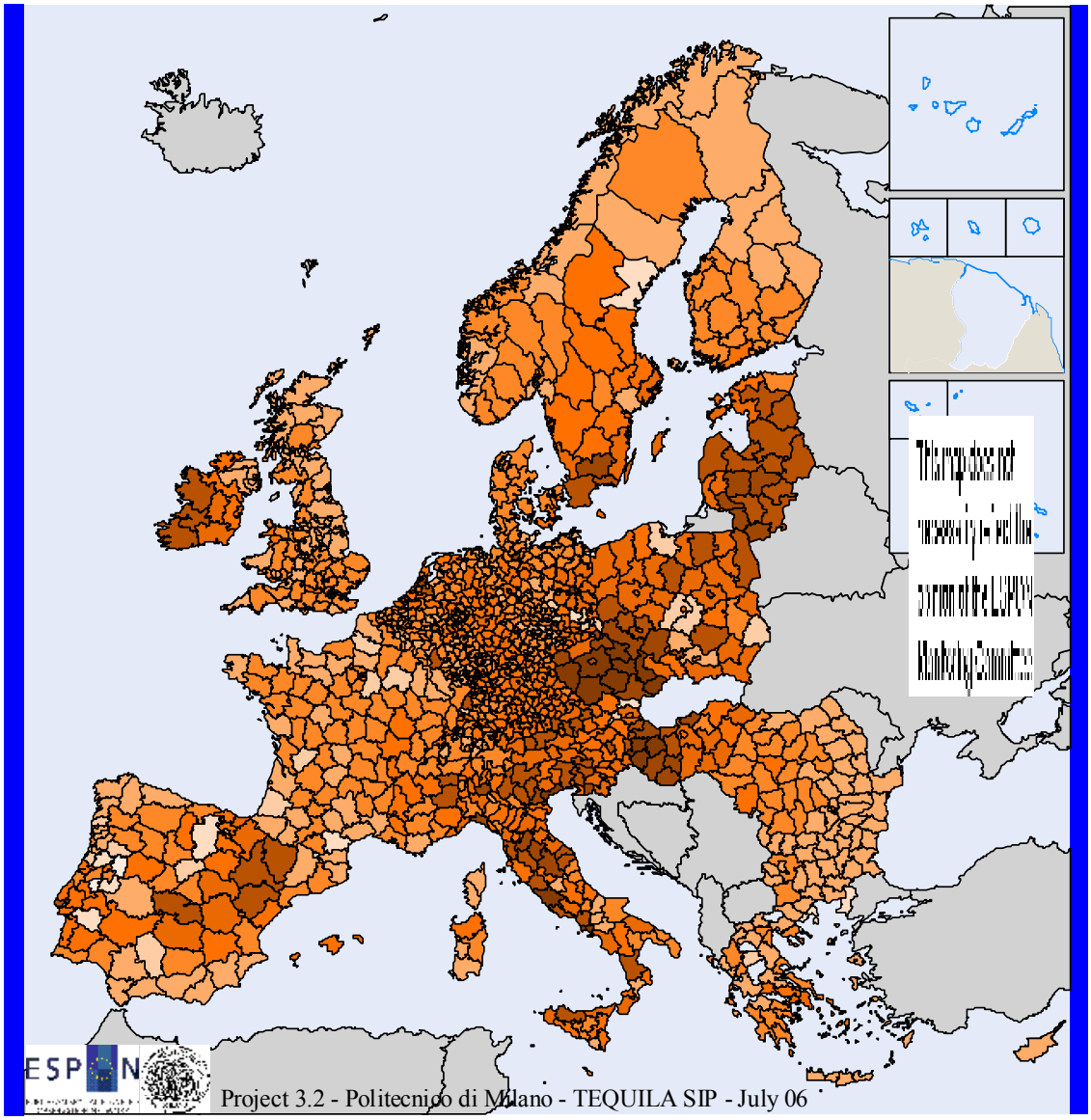
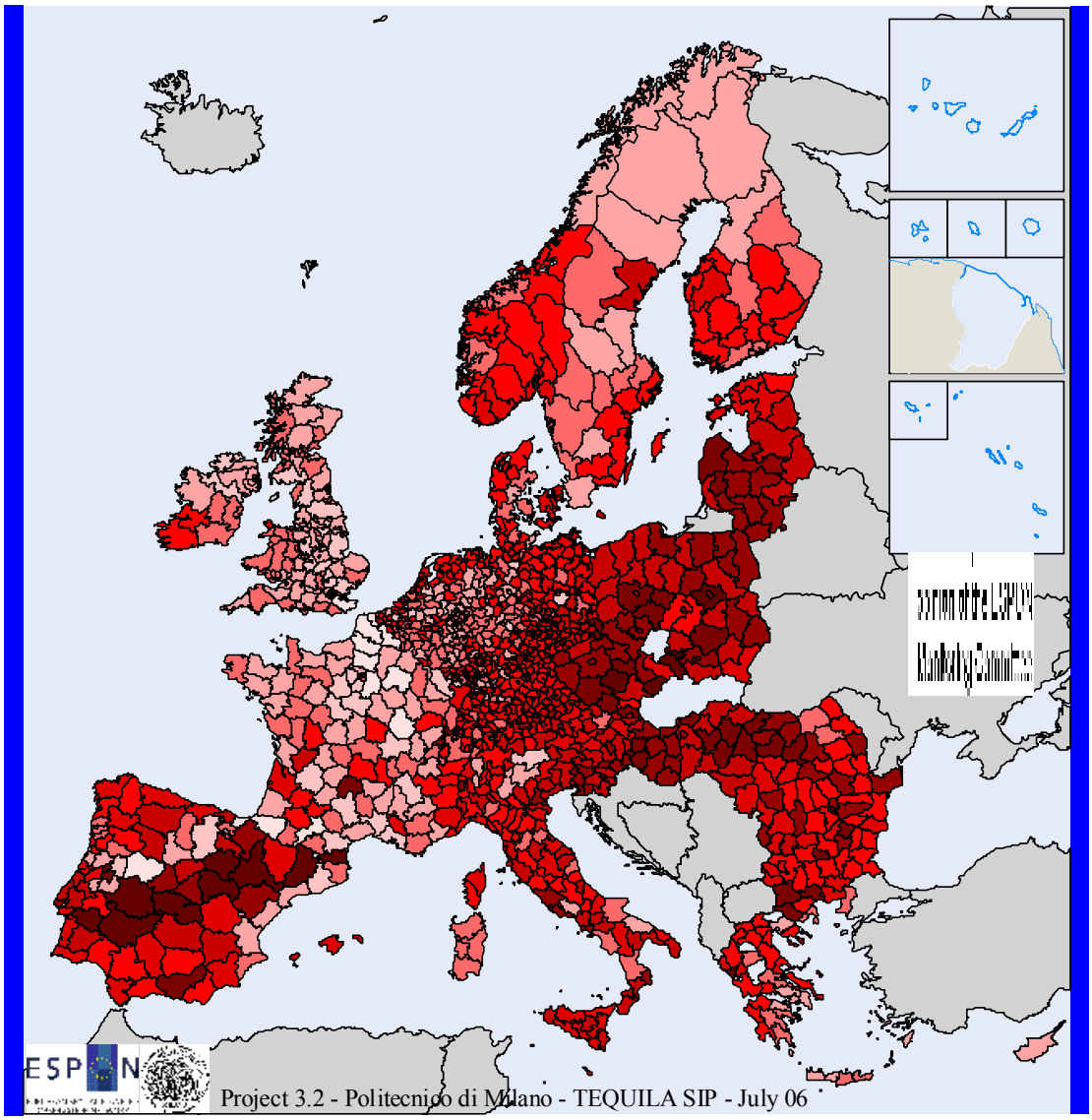


Figure 14 Impact of TEN Policies (priority) on territorial identity



General Territorial Impact
-0.51 - 0.08
0.08 - 0.33
0.33 - 0.45
0.45 - 0.52
0.52 - 0.59
0.59 - 0.66
0.66 - 0.76
0.76 - 0.94
0.94 - 1.25
1.25 - 1.71

Weights:
Territorial Efficiency: 0.33
Territorial Quality: 0.33
Territorial Identity: 0.33

Figure 15 General impact of TEN policies

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