ESPON

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TIP TAP

Territorial Impact Package for Transport and Agricultural Policies

Inception Report

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The present Inception Report of the ESPON Project 2013/1/6 is a team effort of all project partners under the leadership of

Politecnico di Milano, DIG (Lead Partner)
Department of Management, Economics and Industrial Engineering
Contact: Prof. Roberto Camagni
Piazza Leonardo da Vinci, 32
I-20133 Milan, Italy
Tel. (+39) 02.2399.2744 / .2710 (secr.)
Fax (+39) 02.2399.2710
Email: roberto.camagni@polimi.it

Other partners:

University of Newcastle-upon-Tyne
(United Kingdom)

Free University of Amsterdam
(Netherlands)

MCRIT (Subcontractor)
(Spain)

1 TERRITORIAL IMPACT ASSESSMENT: THE GENERAL APPROACH

1.1 Territorial Impact Assessment: the institutional engagement

The necessity of developing a consistent methodology for TIA emerged during the preparation of the ESDP documents, 1995-1999. The final ESDP draft, approved by the Ministers of Spatial Planning in 1999 (CEC-CMSP, 1999), refers to TIA in many respects, and in particular in cases where the different preference or decision dimensions have to find a difficult equilibrium point. 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: "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 needed: "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 n. 29, 42, 52), and in a final recommendation: "Member States should intensify the exchange of experience on *territorial impact assessment*" (par. 185).

The engagement to develop a coherent methodology for TIA was subsequently taken up at the Informal Ministerial Meeting in Tampere, September 1999, with the *ESDP Action Programme.* Three Strands of Action were decided, and inside the first strand, addressed towards the promotion of "a spatial dimension in Community and national policies", the action concerning *Territorial Impact Assessment*: *"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 elements have to be highlighted: the fact that no common concept for TIA does in fact exist at present; the multisectoral nature of the methodological approach; the fact that impact should refer to specific territories, those addressed to 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 a more coherent implementation of the Sustainable Development Strategy through the assessment of the potential impact of policy options (CEC, 2002), subsequently applied to a number of Commission's 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, 2004a).

The general goal of integration of the different dimensions on which impacts may be evaluated, going beyond Strategic Environmental Assessment and other mono-dimensional assessment tools, is similar to the TIA one; the main difference regards the aggregate perspective in terms of territorial impacts of IA, as its main level is a comprehensive, Europe-wide one, with possible indications only of differential impacts on specific typologies of regions (e.g. urban/rural) (CEC, 2004a, p. 11), while TIA should apply both to the general and the specific territorial level.

The necessity of developing a new concept for TIA was subsequently taken up by the ESPON Programme 2006. General indications and requirements for a TIA approach were developed inside ESPON Project 3.1., but only at the end of the ESPON 2006 experience a consistent and operational proposition of a TIA methodology was developed and applied to the priority TransEuropeanNetworks projects inside ESPON Project 3.2, with the Tequila model.

1.2 The scientific base: the TEQUILA Model

The methodology and the general philosophy of the present project builds on the scientific and operational achievements of the TEQUILA model, fully developed as a simplified and prototype model for the ESPON 2006 Programme. The Final Report on *"Territorial Impact Assessment of the Union's policies – TIA: a methodological proposal and an application to TENs policies - The TEQUILA Model"* inside ESPON Project 3.2. was presented in July 2006[1].

The TEQUILA model provides the general logical and methodological framework that can be used in order to carry on the Territorial Impact Assessment of public policies. At its present state, is a simplified prototype: some complexities of the multi-criteria model were taken outside and managed in a transparent but simplified way. The value functions, for instance, were just decided by the model developer. The present project will refine the existing version of the model, both in its methodological and its operational aspects to achieve a fully operational model: TEQUILA 2. In order to do so, the existing version will be simultaneously tested in the assessment of European transportation and agricultural policies by experts having experience on policy-assessment studies in the field, and possibly by the ESPON Monitoring Committee and the European Commission.

The basic features of the TEQUILA model are fully consistent with the Terms of Reference concerning ESPON Applied Research Project 2013/1/6 – Territorial Impact Assessment of Policies. In fact:

[1] The full description of the TEQUILA model is presented in the ESPON website, Project 3.2: "Spatial scenarios and Orientations in relation to the ESDP and Cohesion Policy", Third Interim Report January 2006, Volume VI on territorial impact assessment/analysis (TIA): http://www.espon.eu/mmp/online/website/content/projects/260/716/file_1256/3.ir_3.2-full.pdf .
Its theoretical and methodological foundations are presented in Camagni (2006).

A. it assumes the territorial dimension as an integrated and comprehensive frame, encompassing multiple sub-dimensions that are altogether crucial for a modern and wise policy making;

B. it interprets the general objective of a Territorial Impact Assessment of sectoral policies as an assessment of the impact of these policies on the general "territorial cohesion" objective of the Union;

C. it shows how differentiated in terms of territorial impact might be the effects of sectoral policies which "hardly take account of territorial objectives";

D. it takes directly into consideration "the economic, environmental, social and cultural fields" as the dimensions on which impacts of policies should be assessed;

E. it acquires and makes most from existing knowledge and scientific results concerning the assessment of the impacts of specific European policies, in particular the research works developed inside the ESPON programme;

F. it is in a measure to host both qualitative and quantitative judgements, supplying a consistent scientific and operational framework for a "*summative*" evaluation of the territorial impact of policies, guaranteeing at the same time a separate evaluation of the impacts on each single field (or sub-dimension).

In conclusion, the TEQUILA model offers a logically sound starting point to the present research proposal, as it couples scientific rigour and operationality. The methodology, based on a multicriteria approach, though simplified and user-friendly, looks consistent; and the operational package – the so called Tequila-SIP: Interactive Simulation Package – has proved to supply promising results assessing the territorial impact of priority TEN projects (defined in 2000-01) on European NUTS 3 regions, a territorial level that looks particularly appropriate when territorial specificities have to be taken into account.

1.3 The Multi-Criteria framework

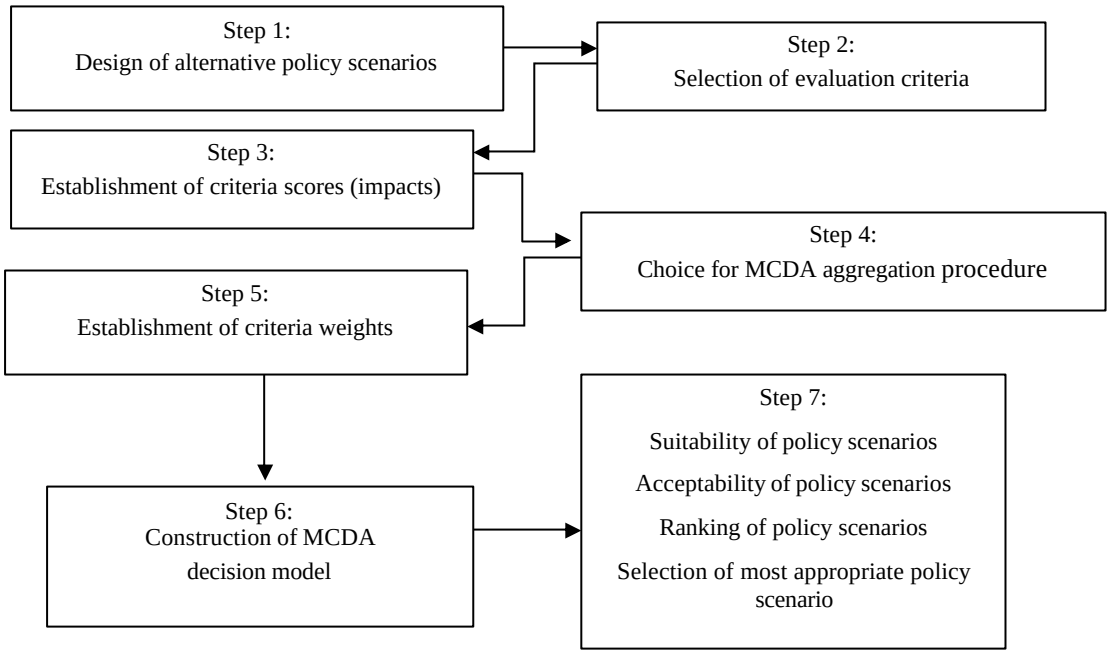
The presence of irreconcilable interests and qualitative information in decision-making situations, generally precludes a meaningful application of unidimensional evaluation and decision techniques, like e.g. cost-benefit ratios, etc. Consequently, in the past decades much attention has been developed to the development of multidimensional evaluation approaches, such as multicriteria or multi objective evaluation methods.

These methods aim at taking into account heterogeneous and conflicting dimensions of complex decision problems. Despite the rich variety of these methods, they all have one element in common, viz. the use of multiple judgement or evaluation criteria. In this regard, multidimensional evaluation has become an important way of thinking, especially as the methods are able to take account of a wide variety of divergent aspects inherent in any decision situation. Besides, the methods offer an operational framework for a multidisciplinary approach to various planning problems.

Given the nature of policies focussing on Territorial Cohesion, it is reasonable to expect that many conflicting objectives and interests may emerge in the decision-making situation. This implies that the use of multiple criteria methods offers some interesting opportunities.

Seven steps may be defined in the MC framework (Figure 1.1). In general, the first three steps of MC decision assessment procedure involve the definition of policy alternatives, the selection of evaluation criteria and the associated scores (impacts). The assessment of impacts entails the measurement of changes in welfare of all stakeholders by the policy concerned. Part of these effects can be measured in monetary terms, part not; this especially applies to environmental or safety effects, etc. The result of these steps is the construction of a dataset consisting of the impacts the alternatives considered have on a selection of relevant criteria. Furthermore, the dataset is analysed. Questions like: "what type of data is at hand (ordinal, cardinal, etc.)?", "is the dataset complete?", "can relationships among the data be found?", "can the dataset reduced without losing information?", etc are addressed. The result of this step is the assemblage of a structured information table that forms the input for an evaluation method and thus for the final evaluation of the alternatives.

Fig. 1.1 – The seven steps in Multi Criteria Decision Assessment procedure



The fourth step involves the choice for an evaluation method to be applied, capable of comparing impacts on different dimensions/criteria. There is clearly no single evaluation method that can satisfactorily and unequivocally evaluate all complex aspects of TIA-policies. The choice for an evaluation methods (or combination of methods) is therefore dependent on the features of the decision problem at hand, on the aims of the analysis, and on the underlying information base.

In this project the TEQUILA model will be applied to transport and agricultural policies. The model is based on Weighted Summation and has its roots in Multi Attribute Utility Theory. Though very simplified, the main advantage of the TEQUILA Model appears the transparent aggregation procedure it incorporates. Instead of being a black box to non-experts, the applied method is easy to understand by decision-makers and other stakeholders.

Up to now, the weights in the TEQUILA model were defined "from above", by the model builder, though within a totally transparent procedure which allows interactive change of the weights (during technical meetings, arenas, …). In the present project the weights will be defined with a mixed procedure, through experts meetings and possibly "from below", under the suggestion of end users (policy makers at any level).

In the research, another MCDA-method will also play a relevant role, namely the Flag Model. As the TEQUILA model is based upon Weighted Summation, a very bad score on one criterion can be compensated by a good score on another. Should we allow that a very negative score on the environmental dimension can be compensated by a good score on other dimensions? Or should we establish, in consultation with experts, critical threshold values (CTVs) which may not be exceeded? A simple rule can then be applied: in case the impact of a policy alternative exceeds a critical threshold value in some regions, it should not be compared or averaged with impacts on other dimensions/criteria and taken into consideration in the decision-making procedure; the case should be inspected per se and compensation interventions should be envisaged.

The Flag Model is a highly attractive method for pre-screening impacts by means of a CTV analysis. We will discuss this MCDA-method in more detail in the following sections.

Step 5 consists of establishing the priority weights that may be assigned to the evaluation criteria selected to reflect the impacts of the policy alternatives by the decision-makers. These priority weights should reflect the preference structure of the decision-maker. In this research project we make use of expert panels to establish the priority weights. Through these groups of experts we not only assess the priority weights but also the value functions associated with the other components of the assessment model, namely the sensitivity/desirability of the dimensions/criteria for different categories of regions and their vulnerability to particular "potential" impacts. In the subsequent sections we discuss this approach in more detail.

In the logical structure of the model, an important part is played by two variables: vulnerability of the single regions to differentiated impacts and desirability of different territorial objectives. Also in this case the present approach given of the TEQUILA model will be strengthened.

1.4 General objectives of the project

Following the requests of the ESPON terms-of-reference, the present project is structured along the following objectives.

A. The general goal**: providing a robust and fully operational TIA tool**, with a sound scientific and methodological basis. The principal requirements:

- methodological and scientific soundness,
- operationality on the basis of available indicators at the right territorial scale, in order to provide territorial impact indicators for all European regions,
- structuring of the whole process into an *operational package* which should be easy to manage, interactive, transparent,
- supplying results which could be useful (and comprehensible) for policy makers: they should show where will the major impacts happen and why.

These goals will be achieved building, as already said, upon the experience of the TEQUILA model (and the TEQUILA SIP for the operational package: **I**nteractive **S**imulation **P**ackage), through a completely renovated and improved model: TEQUILA 2, tested by experts on carrying on policy assessments in the transport and agricultural domains, as it is explained next.

B. The model and its operational package will be applied to **two main policies** of the Union: **transportation policies** (considering also national policies) and **agricultural policies.**

C. **Four types of impacts will be explored**, as requested:

- **C1. Impacts on regional situation: economic/social/environmental**. Each dimension will be analysed through specific indicators (GDP, employment, unemployment, emissions, etc.) and impacts will be typically *single-dimension impacts* (SDI). If requested, also a *summative impact* (SI) will be provided,

encompassing all three dimensions (economic/social/environmental); in this case, the weighting system will be similar to the one utilised in the Territorial Impact (C4), as similar, but differently combined, indicators will be used;

- **C2. Impacts on regional competitiveness (Lisbon strategy***)*: indicators will refer to productivity increases, process innovation, creativity and product innovation, innovative use of local assets and resources;
- **C3. Impacts on climate change:** indicators will refer to different types of environmental impacts (transports, cattle breeding, green spaces, energy use, …);
- **C4. Territorial impacts:** the starting point in this case will be the theorisation at the base of the TEQUILA model (see next point).

D. In the part of the research dealing with **Territorial Impacts**, the definition and operationalisation of territorial goals – on which impacts will be assessed – will be related to the concept of ***territorial cohesion***.

Territorial cohesion is defined here as "the territorial dimension of sustainability" (adding to the other traditional policy dimensions represented by the technological dimension, the political/diplomatic dimension and the dimension of habits and behaviours). It is split in three sub-components (and goals), namely: territorial efficiency, territorial quality, territorial identity. On their turn, these sub-components can be further disaggregated into more precise and homogeneous elements, which supply the criteria and indicators on which impacts may be calculated (see the following par. 1.5).

E. The main hypotheses on **cause-effect impact relationship** will be presented for each of the two policy cases (see section III). This task is assigned to the expert partners (Subcontractor to LP for impact of transportation policies; Project Partner 2 for impact of agricultural policies), who are in charge of the impact of the two EU policies. The impacts will be assessed through quantitative modelling (e.g. for transportation impacts), if possible, or through panel-expert judgement. In the case of transport policies, already explored in the past through quantitative models, the general philosophy and calibration methodologies will be evaluated and re-confirmed with the necessary amendments and updating. Similarly, concerning agricultural policies.

F. Explorations about the possibility of considering also **interregional spillover effects**:

- economic spillovers (through macroeconomic regional models like the MASST model – forecasting model of regional development developed inside ESPON 3.2. Project, which explicitly estimates interregional spillover effects -or inter-regional Input-output models),
- demographic spillovers (with demographic migration models or still the MASST model, which includes a demographic sub-model),
- environmental spillovers, through the appropriate territorial models for each type of emissions (air and water principally).

These effects will be precisely defined, and ways to measure and estimate/calibrate them will also be explored.

G. The main structure of the assessment models – both the *single-dimension impact* - SDI and the *summative impact* - SI models – will be **assessed in terms of stability and robustness of results** provided. In particular for the SI, summative impact model (defining typically the territorial impacts), two aspects will be explored in depth:

- the weighting system, devoted to guarantee the comparability between different kinds of impacts, Europe-wide (the relative weight of the economic vs. environmental or social dimensions). In this case, where typically the weights will come from experts judgement, robustness of the proposed weighting system will be tested through appropriate methodologies (pair wise comparisons, absolute and relative rankings, ..)[2],[3]; possibility of an interactive "game" with policy makers changing the relative importance of the different impacts will be fully provided (and is also provided in the present Tequila model). Expert meetings will be organised (by the LP together with Partner 3, which is expert in MC analysis);
- the territorial value or utility function, generating changes on the general weighting system (see previous point) coming from the specificities of the single regions (the same impact in terms of GDP increase may be differently appreciated by a rich and a poor region). In this case, each partner will host one expert meeting in his country (in order to have information about different evaluations of the single impacts in north/south, east/west, advanced/lagging, urban/rural regions) in order allow to point out the form of a possible *territorial utility function* (in cross-section among all EU regions) (see Section III.2).

H. Utilisation, **extension and updating of the existing ESPON data base** will be granted. Extension to Liechtenstein, Norway, Switzerland, Iceland will be realized and an assessment of the data situation in candidate countries – Western Balkans and Turkey – in view of a future inclusion in the assessment model will be carried out. This task is attributed to the partners developing the impact of single policies, Partner 2 for CAP and Subcontractor 1 to LP for TEN policy.

I. Assessment of average **impacts on specific typologies of regions**, trans-national cooperation areas, cross-border and interregional cooperation areas will be easily performed, given the structure of the assessment model (weighted sum of impacts on single territories, according to relative economic, demographic or geographic size).

J. **Impacts will be assessed, where possible, at NUTS 3 level**, the most suitable for a truly territorial impact taking into consideration the geographical specificities of single regions. Then, impacts will be aggregated at NUTS 2 level, as requested.

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[2] We are not interested here in the ranking of impacts/scores on different regions (attributed by the specific assessment models) but in the relative "importance" of the different impacts.

[3] Weights are at the same time "importance" coefficients and "substitution indicators" (marginal substitution rates among indicators, allowing compensations among different impacts); "summative" evaluations as those that are proposed here implicitly imply compensation among the different impacts. But also non-compensatory aggregation methods (like the one proposed by Munda, 1995, with the non-compensatory multi-criteria approach, or the one defined by Nijkamp and Ouwersloot, 1997 with the Flag model) will be explored. Concerning substitution rates, we prefer additive/linear aggregation methods where substitution rates are constant, because of their simplicity; non linearities can be better included in the model through the value functions, the vulnerability functions and the scaling procedures.

Caveat: many problems are rising in recent months concerning changes in the classification of NUTS 3 (and sometimes also NUTS 2) regions by Eurostat. Given the mainly methodological nature of the project, the reduced size of financial resources and, particularly, the very short time span imposed, the TPG **will not be involved** in the translation of data from the previous classification (which is the one used in ESPON 2006 projects) to the present one, but will use data as available now (thanks perhaps to other ESPON 2013 projects).

K. **Mapping of results, conclusions and policy suggestions** for a better compliance with the Lisbon agenda, climate change agenda or territorial cohesion strategies will be provided at the end by the LP and Subcontractor 2 of LP, on the basis of the work of the impact specialists (Partner 2 and Subcontractor 1 of LP). Concerning mapping, another innovation will be provided with respect to the present state and structure of the operational package (SIP): while results of the assessment procedure are fully automated and integrated into a unique software package, allowing instant simulations, mapping of results requires now a translation of files into another programme. This last operation will also be integrated into the operational package, by Subcontractor 2 of LP.

1.5 Territorial cohesion: from principle to reference for policy assessment

As it was said before, the definition and operationalisation of territorial goals, on which territorial impacts will be assessed, will be related to the concept of ***territorial cohesion***.

The very concept of territorial cohesion still remains somehow fuzzy and deserves clarification and logical consistency. In the Third Cohesion Report the Commission refers to it as a synonym for "more balanced development", for "territorial balance" or "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 improve territorial integration and encourage cooperation between regions", an important indication that may be placed though in a second rank in terms of priorities for policies.

More telling is the subsequent specification of the aspects that the new concept encompasses, at the different territorial levels: the excessive concentration of economic activity and population in the European "pentagon", the imbalance between the main metropolitan areas and the rest of the countries, the 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. These are the main results of the effort engaged through the ESDP, that are now included in a policy document like the Cohesion Report.

A more thorough presentation of the concept of territorial cohesion is given by DG Regio in a subsequent report, the "Interim Territorial Cohesion Report" (CEC, 2004c) devoted specifically to the subject, taking advantage of the early results of the ESPON program and of other Commission studies. According to the Report, territorial cohesion is 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, pg. 3). The subsequent exemplification of the fields of application is similar to the one of the main Cohesion Report.

Subsequent policy documents and political statements on the subject did not develop the concept any further. The Presidency conclusions of the Informal Ministerial Meeting in Rotterdam, 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). In spite of the persisting fuzziness of the concept, the reference to a "territorial setting" allowed Ministers to engage themselves until 2007 in a 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 the subsequent document on "the territorial state of the Union", a kind of 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 remains the same, but it acquires a new "practical" meaning when it is 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).[4]

Once arrived at this stage of comprehension of the content of territorial cohesion, a further small step forward is necessary to reach a proper theoretical definition of the concept.

In our opinion, if the concept of territorial cohesion has to add to the content of economic and social cohesion, it must necessarily link with the sustainability issue. In a word, territorial cohesion may be seen as *the territorial dimension of sustainability.* And similarly to the concept of sustainability, it bears at the same time a positive and a normative sense (i.e., defines a condition and a policy goal) and operates by integrating different dimensions: the economic, the social and the environmental one.

The preceding definition may be explained in the following way. Considering both the positive and the normative side, sustainability conditions (and sustainability goals) refer to (and can be reached by operating through) four main (policy) dimensions (Camagni, 1998; Camagni, Capello, Nijkamp, 2001):

- 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 the international strategies to assure co-operation among countries at different development levels, with different development expectations, and

[4] Relevant innovations are present in this passage. 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, potentially generating productivity increases ("higher return for specific kinds of investment") and utility flows to local communities.

- the *territorial dimension*, residing in an ordered, resource-efficient[5] and environmental-friendly spatial distribution of human activities.

In our opinion, territorial cohesion refers directly to the last dimension [6]. Taking this reflection further, we can envisage three main components of territorial cohesion, namely:

- *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 efficiency*: resource-efficiency with respect to energy, land and natural resources; competitiveness of the economic fabric and attractiveness of the local territory; internal and external accessibility;
- *Territorial identity*: presence of "social capital"; capability of developing shared visions of the future; local know-how and specificities, productive "vocations" and competitive advantage of each territory.

These objectives may be reached through an integrated approach, securing the virtuous integration and positive co-evolution of the three sub-systems mentioned above - the economic, the social and the physical-natural systems - in their spatial manifestation or phenomenology (Figure 1.2). This means maximizing the synergies and the positive cross-externalities from each sub-system and all the others, and minimizing the negative externalities (Camagni, 1998)[7].

The integrated, multidimensional nature of the sustainability concept provides a rationale for an integrated approach to territorial cohesion policies. But other elements push in the same direction, namely:

- the fragmentation of decision making powers, both in the public and the private spheres, with a diffuse presence of veto powers. This fact calls for the necessity of an integration and a co-operation, both vertical and horizontal, between the different tiers of the public government structures (usually engaged in different policy fields) and between the different departments of the same administration acting on the territory;
- the evidence of growing problems and concerns in specific territorial contexts, which call for complex, multidimensional interventions: metropolitan development, peri-urban settlement structure, coastal development, development through wide industrial corridors, sensitive environments like mountain areas crossed by international mobility corridors, … What really matters is the overall result of an equilibrated spatial development process, not the single dimensions through which such an equilibrium can be reached (infrastructure efficiency, proper land-use, smart development policies).

Territorial efficiency, quality and identity represent objectives and values in themselves; no modern society can do without them, as they are at the base of local collective wellbeing. But they are at the same time preconditions for local competitiveness and no conflict exists in this sense between the needs of the local population and the needs of the economic fabric, at least

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[5] We are referring to land resources, energy, natural and landscape resources.

[6] One also has to bear in mind that the sustainability concept refers and links the need for ecological equilibria to the needs of the entire society, and therefore addresses a correct integration or co-evolution of the natural, the economic and the social system. Here we can find the link with the term "cohesion".

[7] As an example among others: economic development in peripheral areas may be advantageous to the environment if a long term perspective on the use of local natural resources is taken and if it provides the (public) financial resources that may be channelled towards the betterment of environmental infrastructure; at the same time it may guarantee the permanence of the local population and the strengthening of its production culture and sense of belonging.

not in the long run. This element is conceptually utilized in recent EC's documents (Luxembourg Presidency 2005a and b) in order to justify compliance and consistency between cohesion policies and the Lisbon strategy; this may be considered a strong political point, but it incurs nevertheless the risk of leaving the quality of life element in the backstage.

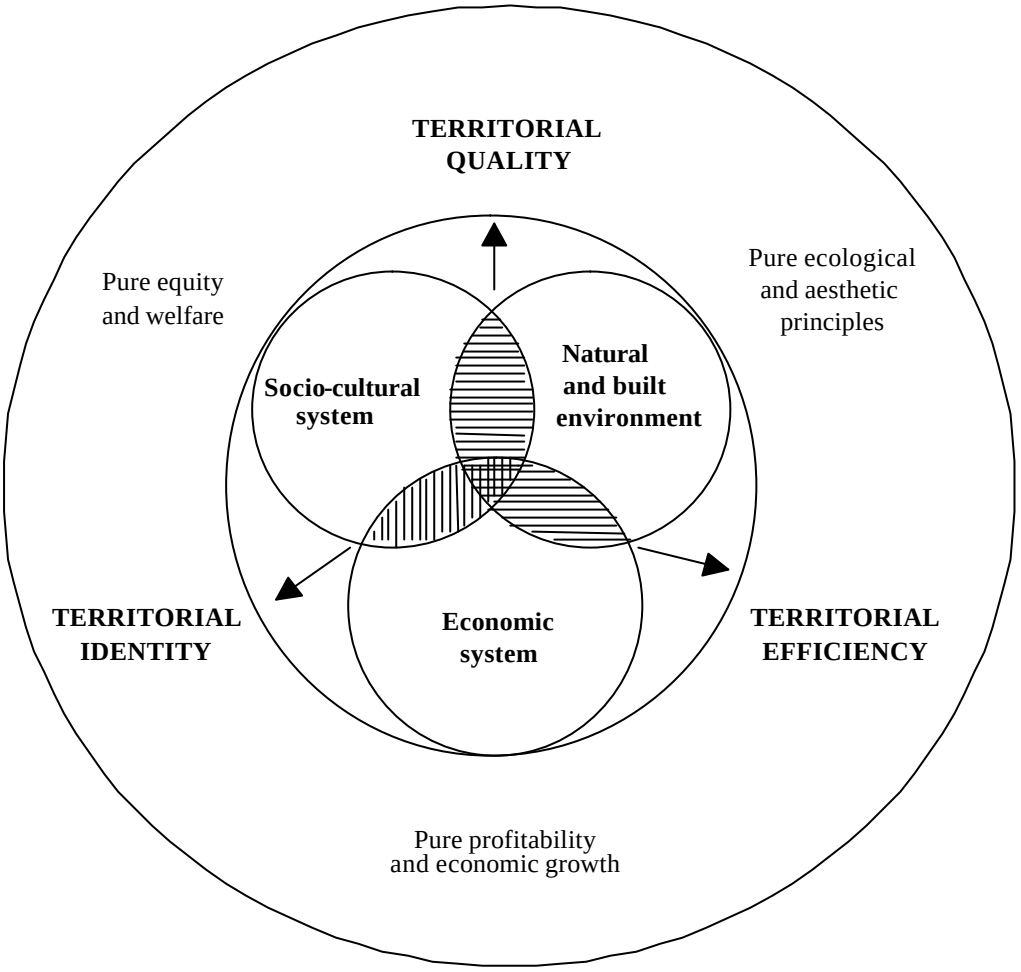
While the first two objectives are rather familiar, the third, namely territorial identity, may be seen as rather surprising, but is in our opinion crucial and will become increasingly central for European policies. Territorial identities incorporated in local culture, know-how, social capital and landscape are the basic constituents of the territorial realm as, at the same time:

- they represent the ultimate glue of local societies,
- are linked with the spatial division of labor and in many cases determine its evolution,
- facilitate processes of collective learning and consequently boost the efficiency of the local production fabric.

Identities evolve but may be easily destroyed by spatial processes such as those of economic decline and desertification, peripheralization and lack of accessibility, destruction of the natural heritage, trivialization of territorial landscape through sprawling settlements. For these reasons they are fundamental constituents of territorial cohesion[8].

[8] An important step in this direction is made by the already mentioned recent Scoping document of the Luxembourg Presidency (2005a), where natural but also cultural values are indicated as part of the endogenous potential of the different areas, worth a full exploitation. Furthermore, it is worth mentioning that the ESDP begins and ends with a reference to culture, cultural variety and cultural heritage as a characteristic feature of the European identity.

Figure 1.2 The components of territorial cohesion



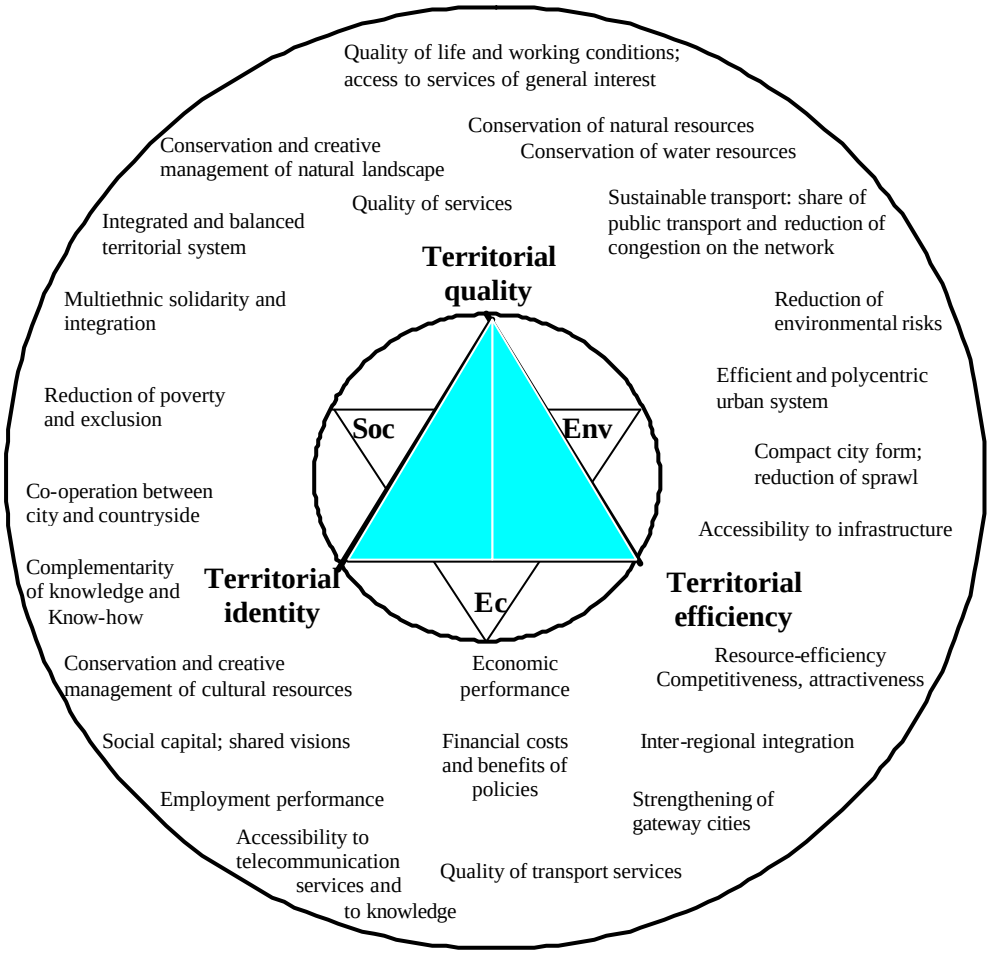
Territorial quality: quality of living and working conditions; comparable living standards across territories; similar and fair access to services of general interest and to knowledge

Territorial efficiency: resource-efficiency with respect to energy, land and natural resources; competitiveness and attractiveness; internal and external accessibility

Territorial identity: presence of social and relational capital; capability of developing a shared vision of the future; know-how, specificities, productive "vocations" and competitive advantage of each territory

Which issues deserve attention from the new territorial impact assessment (TIA) point of view? They may be found and described in the documents mentioned earlier, particularly in the ESDP, and may be summarized as in Figure 1.3.

Figure 1.3 – An integrated strategy for territorial cohesion: objectives and assessment criteria



2 DEVELOPMENT IN METHODOLOGY: TOWARDS TEQUILA 2 MODEL

2.1 Some basic features of the TEQUILA 1 model that will be retained

Some basic features of the TEQUILA model, which come from the past in depth reflection on both the scientific and operational foundations of a TIA procedure, will be retained. In fact, these reflections were in a measure to provide a fully developed, workable model for TIA, something that was not readily available elsewhere. The main elements that will be retained may be indicated in the following:

1. **The multi-criteria approach**: in fact, territorial impacts are so widely differentiated and touch so many different dimensions (economic, social, physical, environmental, cultural, …), that a unique expression in monetary terms (as in Cost-Benefit Analysis) looks impossible.

2. **The possibility of providing** at the same time **a *single-dimensional impact*** - the impact on a single dimension of the assessment problem: on economy, society, environment, landscape, ... – **and a *summative impact***, generated by an appropriately weighted summation of the impacts on single dimensions.

3. **The possibility of combining qualitative and quantitative impact measures**, in order to take advantage of most existing quantitative evaluations and "fill the holes" with qualitative expert judgements. This goal is achieved through a unique scaling procedure of the single impact measures, that resolves at the same time the problem of variables standardisation (under control of an experts panel).

4. Evaluations of **impacts on single territorial "dimensions"** (*single-dimensional impact*s) are implemented utilising the best and most suitable techniques, case by case – making best use of existing assessment practices realised inside the ESPON programme. These assessments will be carried out by the project partners in charge of the single policies (transport and agricultural policies). On the other hand, the comprehensive, ***summative* model** - TEQUILA 2 model - will be managed by the Lead Partner in cooperation with the partner expert in MCDA, namely Partner 3; restructuring and improvement of the previous operational package, the Tequila Sip, will be managed by Subcontractor 2 to LP.

5. The logical split of the impact assessment into **two different territorial layers**:

- **1st layer:** ***General Assessment*** of the impact of EU policies on the *overall European territory*: to be intended as a "potential impact" on an abstract territory (PIM). This assessment is made through an expert judgement, qualitative in nature.

Its goal is twofold: firstly, defining typologies of territorial impacts that are not usually expected as a consequence of sectoral policies (e.g., impacts of CAP on environment,

landscape, climate change, and not just on agricultural sector or rural development; impacts of transport policies on culture and identities, and not just on accessibility, GDP and environment); and secondly pinpointing those impacts that are interregional in nature, e.g. impacts on regional disparities or impacts on policentricity.

- **2nd layer: "*Territorial Assessment*" *on each region*** (or "territorialized" impact: TIM). In fact, the potential impact has to be made truly territorial, region-specific, as:
  - the *intensity* of the policy application may be different on different regions,
  - the *relevance* of the different fields or "criteria" is likely to be different for different regions, according to their *utility function* (the same impact on employment may have a completely different meaning in an advanced and in a lagging region),
  - the *vulnerability* of the different regions to similar "potential" negative impacts is likely to be different (an urbanised region is more vulnerable to a chemical catastrophe than a desert region)
  - the *receptivity* of the different regions to similar "potential" positive impacts is likely to be different (an entrepreneurial region is likely to benefit more from public incentives to R&D than a "dependent" region),
  - a region may not be subject to a specific policy.

6. **The rationale for the "territorialisation" of potential impacts** lies on **a symmetry with the risk assessment procedure**. 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 linked to the specificities of each territory.

In symbols (for quantitative impact assessment):

$$\mathbf{TIM}r = Sc\ \mathbf{?}c\ .\ (\mathbf{PIM}r,c\ .\ \mathbf{S}r,c\ ) \qquad (1)$$

where:

TIM = *territorial impact*
c = criterion of the multi-criteria method (e.g.: efficiency, quality, identity)
r = region
?c = weight of the c criterion
PIMr,c = potential impact according to *quantitative* assessment
Sr,c = *sensitivity* of region r to criterion c

In its turn, sensitivity is a vector (weighted sum) of regional characteristics defining two main elements:

- ***vulnerability/receptivity*** to single types of impact (geographic indicators)[9] and
- ***desirability*** of the dimension/criterion (economic vs. environmental vs. social or cultural dimensions); technically, this is managed through a *territorial utility function*, mainly socio-economic indicators) of region r.

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

In symbols:

$$\mathbf{S}r,c = \mathbf{D}r,c \,.\, \mathbf{V}r,c$$

where:

Dr,c = *desirability* of criterion c for region r (territorial "*utility function*")
Vr,c = *vulnerability* of region c to impact on c (*receptivity* for positive impacts)

In *qualitative* assessment, where the potential impact on a dimension/criterion c is only defined in generals terms and does not refer to specific territories, we have:

$$\mathbf{PIM}r,c = (\mathbf{PIM}c \,.\, \mathbf{PI}r\,)$$

where PIr = policy intensity in r. Subsequently, the general formula 1) applies.

The study of the territorial utility function included in the term **D**r,c will be carried out through expert meetings in the countries covered by the partners, in order to understand differentiated regional values (advanced/lagging, eastern/western, urbanised/agglomerated/ rural regions).

7. The basic structure of the TEQUILA model will be **improved and renovated** in multiple directions:

- first of all, in order to comply with the requirements and desiderata of the Commission and the ESPON terms-of-reference;
- secondly in order to strengthen the methodological base of the model (number of criteria/indicators for impact assessment; improvement of the vulnerability and receptivity indicators; weighting system and commensurability of the different criteria; possibility of non-compensatory approaches; territorial utility functions);
- thirdly, in order to enlarge the typology of impacts towards secondary and indirect effects and spatial spill-overs.

2.2 The Multicriteria framework: value functions and compensations among criteria

The simplified structure of the value functions utilised in the present TEQUILA model, allowing the definition of weights and of the "territorial utility functions", will be strengthened in the present project, including complex methodological refinements and utilising selected expert judgements.

2.2.1 Assessing value functions through expert judgement

Various strategies exist to assess the values of the weights used (?c), Sr,c, PIM and PI. This research project will assess so-called value functions for the concerned components.

The value function theory is a branch of a more general theory based on the concept of utility maximisation. The fundamental assumption in utility theory is that there exists a real-value function, called utility function, which transforms the impacts of an alternative into a utility score. This utility score is what the decision-maker wants to maximise. Value functions do also translate the impacts (scores) of an alternative or policy into a single score - usually normalised from 0 to 1, where 0 and 1 values represent the worst and best situations attainable. The TEQUILA model above can be interpreted as such a value function. The model can be described as a weighted additive combination and aggregates in a weighted manner for each policy alternative the value attached to each attribute to determine a single score. The construction of such a value function model requires four steps:

1. The definition of the range of scores (*Ri)* for each attribute *(Xi)*;
2. The assessment of value functions for each attribute (marginal value functions);
3. The assessment of weights;
4. The combination of the marginal value functions into an overall value function model.

The specification of the ranges of scores in step 1 defines the evaluation domain. For each attribute range two scores are important namely, (x_i^*) which represents the best score possible and (x_{i*}) which represents the worst score.

The set of best and worst scores for all attributes determine the best $x^* = (x_i^*,..,x_n^*)$ and worst $x_* = (x_{i*},.., x_{n*})$ situations (alternatives) attainable with regard to the fulfilment of the decision objectives.

The value functions are used to translate the score of an alternative on a certain criterion into a value between 0 and 1 (in the Tequila model: between 0 and 5, as it will be explained later). The calculated value represents the relative preference/performance of the alternative on the criterion concerned in comparison with the best and worst scores attainable.

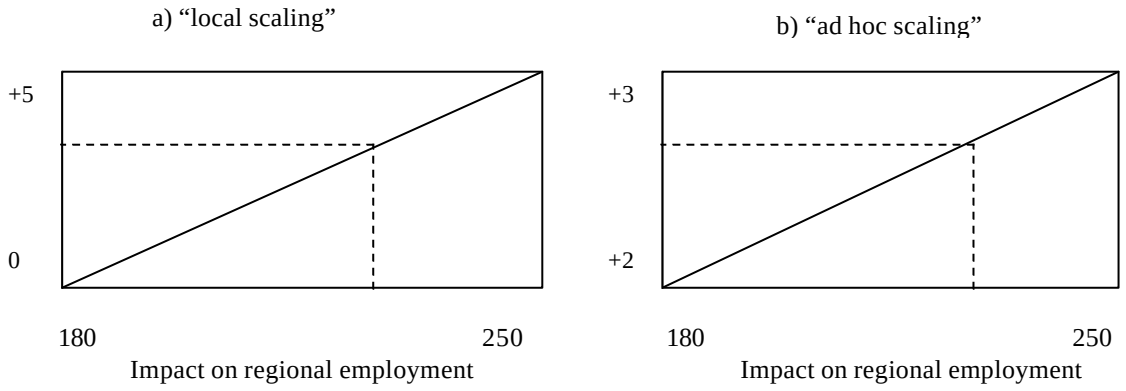
In the TEQUILA model, the scores referring to impacts, defined by quantitative models or through experts judgement, are translated into a scale going from 0 to 5 for positive impacts, and from 0 to -5 for negative impacts, in order to attribute a sounder meaning to the scores themselves. The values are as follows:

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

Through this procedure, an initial though rough consideration of interest conflicts among different classes or sections of society is possible.

The extreme values should not be assigned to *observed* values of impacts on the different regions (*"local scaling"*) [10] but to extreme "possible" or "expected values" (*"global scaling"*). But as defining expected possible values could be a difficult and highly subjective operation, a similar method to "global scaling" is followed (similarly subjective) which can be labelled as "ad hoc" scaling, more consistent in the present statistical framework: assigning the current values of the impact to an interval defined inside the abstract +5/-5 scale according to a subjective judgement on the absolute relevance of the impacts assessed. In fact, the impacts assessed on the different EU regions could well belong to a small "qualitative" interval, as in Fig. 2.2.1, and it would not be wise to assign them to a scale going from an absolute minimum to an absolute maximum, as in "local scaling" procedures [11]. The ad hoc intervals for the scaling of observed impacts, being intrinsically subjective, have to be justified explicitly and corroborated through expert judgement.

Fig. 2.2.1 – Alternative scaling procedures in quantitative assessment



For what concerns weights, they are used to combine the marginal value functions into a single value function model representing the preference structure of the decision-maker. In the value function model, the weights represent the relative importance of each attribute (criterion) to the others. More precisely, weights are linked to the change in the overall value of an alternative when moving the criterion score from its least to its most valued situation, while keeping all other criteria score equal.

[10] Generally, this last procedure is followed when a large amount of indicators is available. But it does not appear consistent in our framework, as it is exp lained.

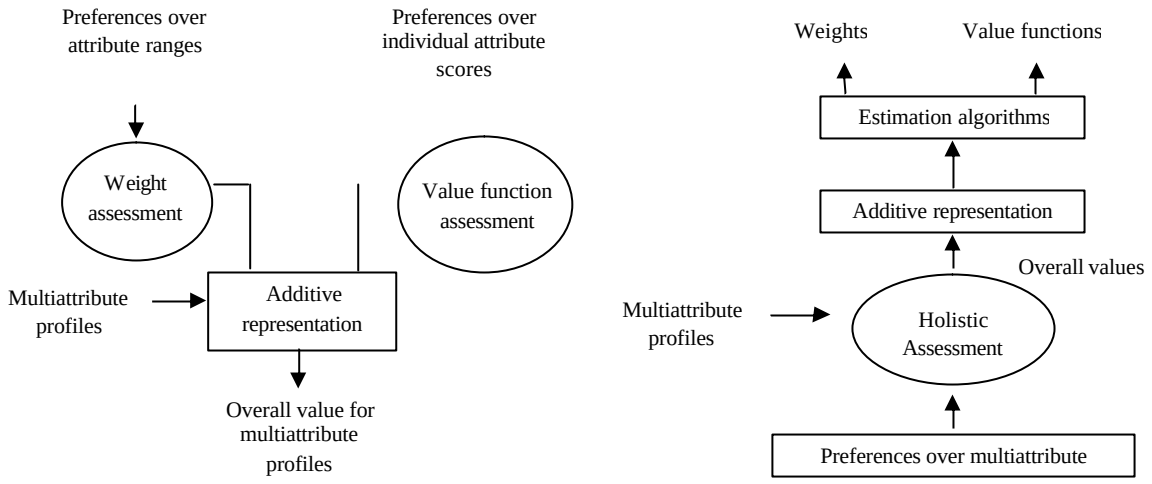
[11] In Fig. 2.2.1, the impact of a policy alternative on employment in the different European regions, going from 180 to 250 estimated new jobs should not be assigned to the general interval +5/0 but, more wisely, given the proximity of values and the reduced size of the impact distribution, to a proper +3/+2 scale. The definition of the interval is subjective, and has to be submitted to expert judgement.

Weights in the TEQUILA model are indicated with ?c, and are normalised so that they sum to 1. **Expert sessions** will be organised in order to establish a sound value for intervals and weights. Their conclusions could be subsequently changed by political decisions, and impacts redefined interactively. These sessions are designed to establish the appropriate form of the value function model (additive, multiplicative, etc.) and to estimate the marginal value functions and weights to represent the preference of the decision-maker[12] (see Sect. 2.2.4).

The outcomes of this research endeavour should be the construction of value functions and weights for different components of the TEQUILA Model: weights to be assigned to quantitative impacts estimated through quantitative models, and values attributed to specific impacts by expert judgement in a qualitative way.

[12] In general two approaches exist for the assessment of value functions namely, decomposed scaling and holistic scaling. In decomposed scaling, the marginal value functions and weights are assessed separately and the value function model is constructed by combining these parts through the additive combination. Various techniques exist for assessing marginal value functions by means of decomposed scaling. Amongst the most frequently used are: direct rating, curve selection, bisection, difference standard sequence, parameter estimation and semantic judgment. The most common assessment techniques for weights are: the swing method, rating, pairwise comparison, trade-off method and qualitative translation. Which methods are most suitable will be investigated during the research project and the various experts are selected whose opinions are asked for.
On the other hand, holistic scaling is based on overall value judgements of multi-attribute profiles. These profiles can be real alternatives or artificial profiles designed for the assessment. Weights and value functions are estimated through optimal fitting techniques, such as regression analysis or linear optimisation, and are the best representation of the assessors' implicit value functions and weights. The UTA method ("*UTilités Additives*") is amongst the most frequently used approaches for holistic scaling: it is developed by Jacquet-Lagrèze and estimates piecewise value functions through linear optimisation based upon holistic judgements based by the decision-maker (Jacquet-Lagrèze and Siskos, 1982). Fig. 2.2.2 above summarises both approaches in the assessment of value functions and weights.
Within this research project we will make us of both decomposed and holistic scaling. Decomposed scaling is often praised for its simplicity and straightforwardness, however, it requires a significant input of the respondent in the assessment procedure. For example, the qualitative characteristics of the value functions need to be specified before the actual assessment procedure starts. Holistic scaling on the other hand solely needs global preference statements to assess weights and value functions. This may reduce involvement and input of experts significantly. This forms an advantage of holistic scaling. However, its application becomes problematic when the number of attributes is large, for example more then ten. As the number of multiattribute profiles that need to be compared, ranked or rated becomes very large the assessment procedure becomes very lengthy and too complex. In such situations, respondents are not able to recognise the differences between profiles and cannot make meaningful judgments. Within this research project we will make us of decomposed scaling.

Fig. 2.2.2. Two approaches in the assessment of value functions and weights



2.2.2 Compensation among criteria: the FLAG model

The main purpose of the Flag Model, developed by Nijkamp, Ouwersloot and Vreeker (Nijkamp and Ouwersloot, 1997; Nijkamp and Vreeker, 2000), is to analyse whether one or more alternatives can be classified as acceptable/sustainable or not. The Flag Model does so by comparing impact values with a set of reference values (labelled as Critical Threshold Values in the model).

The input for the Flag Model consists of an impact matrix (e.g. structured information table) with a number of *n* variables; this matrix is formed by the values that the selected criteria assume for each considered alternative. The Flag Model requires the identification and selection of relevant indicators, according to the problem which is addressed. There are three classes of indicators in the software programme, which correspond to the following dimensions (1) biophysical, (2) social, and (3) economic. These dimensions can easily be transformed into *Territorial efficiency*, *Territorial quality*, and *Territorial identity* which form the main components of TIA in the TEQUILA model.

For each indicator a critical threshold value (benchmark value) has to be established. An important problem faced in practice is the fact that a benchmark value is not always unambiguous. In certain areas and under certain circumstances different experts and decision-makers may have different perspectives on the precise level of a CTV. Based on the indicator score of an alternative and the CTV specified, colored flags are assigned: green = no reason for preoccupation, yellow= be alert, red=reverse, black=bad.

An important component of the model, the evaluation module, provides a number of instruments for the analysis of alternatives. This analysis can be conducted in two manners. The first type of analysis is the confrontation of a single alternative with the reference system. The second type of analysis concerns the comparison of two alternatives. In the former procedure, we decide whether an alternative is acceptable or not in all regional cases, and in which case should policy be readdressed. In the latter case, by comparing two alternatives, we are able to decide which alternative performs better in the light of the selected critical threshold values. This last option can be interpreted as a basic form or multicriteria analysis.

In order to define the critical threshold values for indicators used in the TIA, expert panels will be consulted.

2.2.3 Territorialisation of impacts through utility and vulnerability functions

As it was shown before, one of the relevant added values of a procedure for territorial impact assessment is the "territorialisation" of potential impacts of policies: impacts on single regions have to be corrected to take the special characteristics (geographical conditions, development level, etc.) of the regions concerned into account.

Sensitivity function Sr,c, desirability function Dr,c and vulnerability function Vr,c are components included in the model to adjust the impacts for differences in the utility functions, receptiveness and vulnerability to certain impacts of regions. The associated value functions are thus region specific and expert knowledge is needed to assess these functions.

Mathematically, some vectors of regional adjustment coefficients have to be provided, taking care of the different utilities, vulnerabilities and receptivities of the single EU regions. These coefficients (that in TEQUILA 1 ranged from 0.8 to 1,2, allowing a correction of maximum 20% of the values), logically and mathematically apply to either the value of regional impacts or to the weights (that become "regionalised").

Three territorial functions have to be modelled:

- a utility function for each criterion/dimension of impact: e.g. the relevance of an environmental vs. and economic impact for the different regions. In Tequila 1, it was a function of the development level achieved (GDP per capita) for economic or efficiency impacts, or a function of present environmental decay (congestion, road emissions) for environmental impacts;
- a vulnerability function for each criterion/dimension of (negative) impact; different functions were used in Tequila 1, according to the impact typology (e.g.: vulnerability to worsening of landscape quality was assumed to be inversely proportional to an indicator of regional landscape fragmentation);
- a receptivity function for (positive) potential impacts.

All these functions will be proposed by the research team and assessed, in their territorial variations by expert judgement.

2.2.4 Reducing subjectivity: methodology and templates for experts meetings

Four experts meetings will be organised in order to corroborate methodological choices made by the research group and to reduce subjectivity elements which are present in the general methodology, namely in the following aspects:

- Definition and specification of ranges of the criteria concerned;
- Specification of weights (values) used to combine the criteria in the aggregate TEQUILA Model;
- Definition and specification of value functions which reflect PIMr,c, Dr,c and Vr,c.
- Definition and specification of threshold for non-compensability among criteria (Flag Model).

Not only is it important to sketch an appropriate procedure for the assessment but also various practical issues need to be solved. This concerns, for example, the composition of our expert panels and the degree of interaction that is allowed between the panel members.

Once the value functions and weights of the various experts have been assessed they need to be aggregated into a single value function model. Two classes of mathematical aggregation methods are frequently used. The first class, based on distance minimisation, estimates the distance that exists between the elicitations of the panel members. The method then searches for the estimate (value function or weight) that minimises the overall distance between the panel members.

The second approach assigns (equal) weights to the panel members and then combine the value functions and weights of individual panel members into a panel value function model.

Furthermore, the information obtained from our expert panel will allow us to analyse the degree of congruence amongst the panel members by various techniques, such as cluster analysis.

The outcomes of this research endeavour should be the construction of value functions and weights for components of the TEQUILA Model which are supported by experts in the field of TIA.

Figure 2.2.3. Procedure for the assessment of value functions and weights (Beinat, 1995)

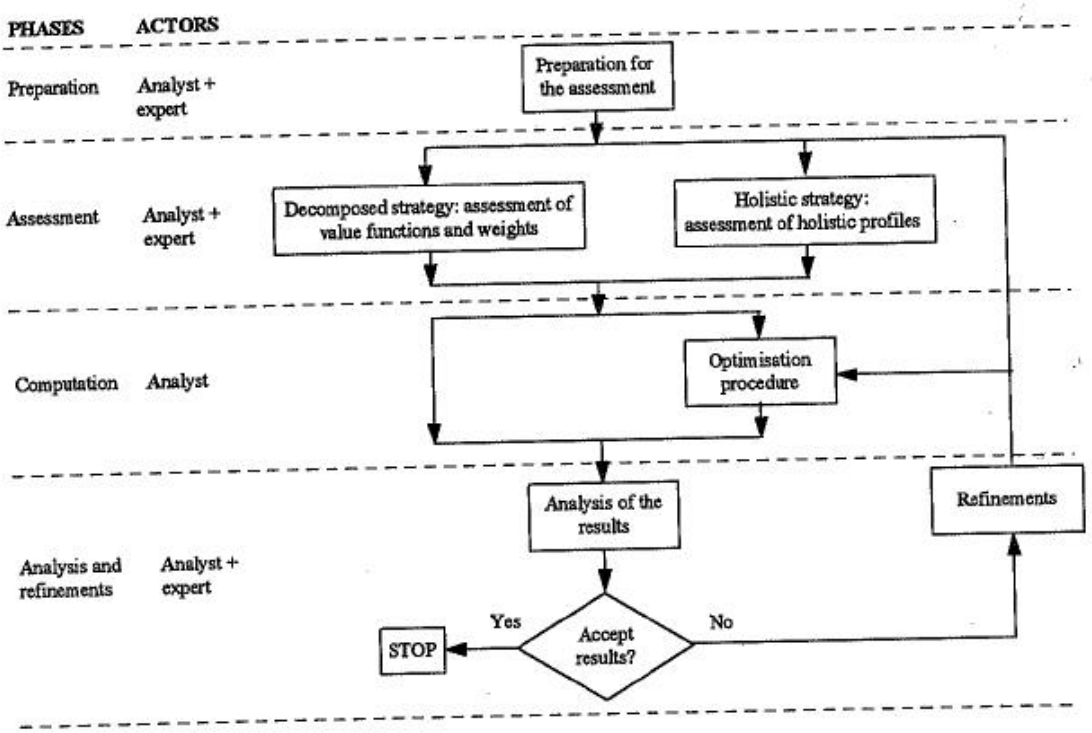


Figure 2.2.3 depicts the procedure that will be applied to assess expert-based value functions and weights. This procedure has been successfully applied in the assessment of value function for environmental impacts (Beinat, 1995).

Four stages can be distinguished. During the first stage experts are invited and briefed about the main objectives of the sessions held. Furthermore, the main purpose and functions of the TEQUILA Model are explained and, the considered criteria and ranges are presented. The experts are invited to respond to the chosen ranges and when necessary adaptations are made by the research team. The experts are also informed about the various components of the TEQUILA Model subject to the assessment.

In the second stage sessions are organised in which the elicitation of expert responses is conducted.

The following stage concerns the estimation of the components of the TEQUILA Model. The information obtained in the expert session is analysed and a good representation of the judgements by means of value functions and weights is sought for.

The selection of experts is of utmost importance for the successful assessment of the components of the TEQUILA Model. For our expert sessions we will invite persons who have a professional interest in CAP and transportation research or policy making. In each session five to ten experts will be involved.

During the expert sessions we will allow face-to-face interaction and the experts will discuss their assessments of the components of the TEQUILA Model until an agreement is obtained about their values, etc. However, during the preparation stage the experts consulted are asked to give their opinion about the criteria and selected ranges. In this manner we hope that the during the sessions the expert focus on the actual estimation of the model components (weights, value functions, etc.), instead of on the ranges.

In the remainder of this section we discuss the setup and subjects of the four expert settings scheduled. In the discussion we focus on the techniques used to assess the components of the TEQUILA Model. A detailed planning and programme of the workshops will be designed at a later stage of the project. When necessary the expert meetings will focus on the policy domains being evaluated by means of the model namely, CAP and Transportation policies. One may envisage that for each of the above mentioned subjects expert sessions I and II will be joined.

Expert session I

The main aim of this meeting is to assess the values of the weights in the TEQUILA Model. These weights are used to combine the scores on the criteria *Territorial Efficiency, Territorial Quality* and *Territorial Identity*. Since these themes contain multiple sub-criteria, their weights will also be assessed during this session. Possible strategies used in the assessment are the Swing method, Weight rating and the Analytic Hierarchy Process.

In case we apply the Swing method for obtaining the weights for the attributes *Territorial efficiency*, *Territorial quality* and *Territorial identity*, the experts are provided with a multiattribute profile which reflects the worst possible outcome (e.g. lowest scores considered). He or she is then asked to indicate which attribute provides the highest value increase when switched to its best state. This attribute is attached the highest weight value. The process continues with the remaining attributes and the last attribute swung is assigned the lowest weight. The Swing method results in an importance ranking of attributes. The method can also be adjusted to obtain numerical estimation of the weights.

Weight rating can be applied to obtain the weights for subcriteria of the considered themes for territorial impacts. In this method the expert is asked to first rank the criteria and then to attach a weight value to the least important criterion that then functions as a references. The other attributes are judged by the experts against this reference criterion and given points. Another option is to rank the criteria and then assign a fixed number of points (e.g. 100) to the criteria while respecting their relative importance.

Another option is to apply the Analytic Hierarchy Process as developed by Saaty (1980, 1990) to obtain the attributes by means of pairwise comparisons. Within AHP criteria are compared in a pairwise manner.

These techniques have been chosen for their intuitive approach and ease of use in applying them. However, explicit reference should be made during the expert sessions about the criterion ranges considered. Without their application and the results produced are questionable.

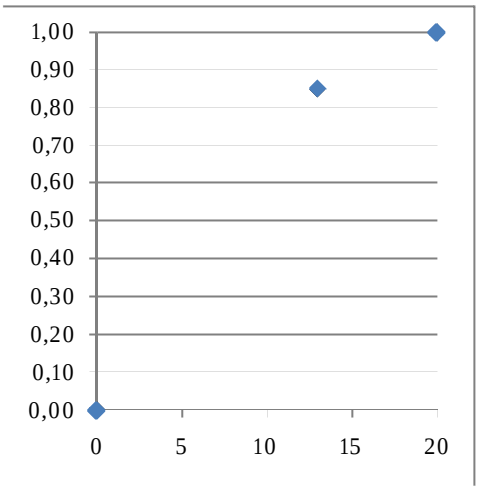
Expert meeting II

During the second expert meeting the potential impact term of the Tequila model (PIMr,c) will be assessed.

Impact values will be provided by the partners, in a mainly quantitative (transport policies) or mainly qualitative (CAP policies) format. These values will be transformed into a 0-1 (or 0-5) scale, according to the methodology indicated in Sect. 2.2.1. Experts will be used in order to give a sounder judgement base to the chosen interval (that we called "ad hoc scaling"), and, in case, to define alternatives to a straight line for the scaling of values. During the expert session we will apply direct value rating.

Direct value rating can, for example, be applied to assess the partial value function of the attribute employment. We assume, for example, that the lowest score for the criterion is $x_{1*} = 0$ and the highest possible score $x_i^* = 20$. The corresponding values are thus $v_1(0) = 0;\ v_1(20) = 1$. The respondent is then asked to value point x_i', in our example 13 jobs – the maximum observed value - in such a manner that $v_1(x_1^*) - v_1(x_1')$ and $v_1(x_1') - v_1(x_*)$ depict the difference in attractiveness between the three points. Figure 2.2.4 shows that $v_1(13) = 0.84$.

Figure 2.2.4 Direct value rating for the partial value function (jobs)



In general, in multiattribute value function theory it is assumed that scores on an attribute are transformed into a value ranging from 0 to 1. In the TEQUILA Model this value is ranging from 0 to 5. However, no major implications are present for the assessment strategy.

To summarize, two objectives are associated with the second expert sessions. First, the results should allow us to verify whether the assumed linear transformation of criterion scores onto the 0-5 range is just. Second, the ranges used will be adjusted so that these could reflect the importance attached to the variation interval of observed values (coming from models or qualitative judgements) inside the general range 0-5.

Expert meeting III

While the second expert meeting is solely dedicated to the definition and specification of PIMr,c, the third focuses on sensitivity parameter Sr,c of the Tequila model. This parameter consists of two components namely, Dr,c and Vr,c. The first indicates the desirability of the criterion c for region r. This desirability will be expressed by means of a value function running between o and 1. The main objective of the expert session is to estimate this curve for each region considered by means of direct value rating.

Reference could be to quantitative existing indicators (e.g. per capita GDP) complemented by adjustment coefficients for specific typologies or regions, namely:

- Northern European regions
- Southern European regions
- Western European regions
- Eastern European regions
- Advanced European regions
- Developing European regions
- Urban regions
- Rural regions

Expert meeting IV

In the previous sections we explained that the Flag Model will be used for the pre-screening of policy alternatives. In the fourth expert session the critical threshold values, used by the Flag Model, are specified. These values are used by the Flag Model to determine whether irreversible trends occur due to the implementation of a policy alternative. When such a situation arises, compensation between criteria scores should not be allowed and a redesign of the policy alternative will be needed before it can be assessed by means of the TEQUILA Model.

Table 2.2.1 summarises the various strategies used for the assessment of the different components of the TEQUILA Model.

Aspect TEQUILA Model	Component	Assessment technique	Expert session
Criteria	Weights	AHP	I
Subcriteria	Weights	AHP	I
PIMr,c	Curve	Direct value rating	II
SIMr,c	Curve Dr,c	Direct value rating	III
	Curve Vr,c	Direct value rating	III
Flag model (Critical Threshold Values)	CTVs	Questionnaires and interviews	IV

2.3 Assessment of EU transportation policies

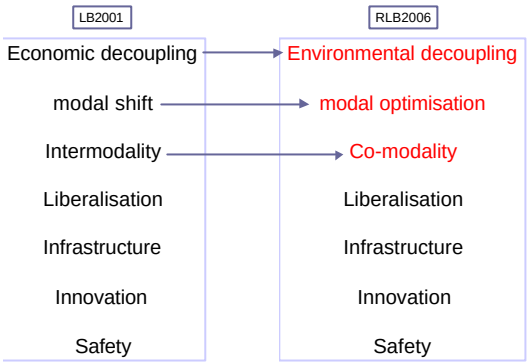
The objective of the task will be to apply the renovated TEQUILA model to assess the territorial impact of the new European transport infrastructure policy being nowadays defined for 2010-2020.

2.3.1 The state of EU transport policy: alternative policy options

The European Commission is now drafting a new Transport White Book 2010-2020, together with new Trans-European transport networks 2010-2030 ("Core Networks" or "High-level networks"), to update and substitute the current White Paper of 2001. Many important changes are expected in European transport policies, in line with the 2006 revision of the White Book.

In particular, the modal shift from road and air, to so-called environmentally friendly modes, in particular rail, is not longer the key strategy towards more sustainable transport; instead, a mix of infrastructure capacity increase, better capacity management and more efficient pricing, in the road and air sectors, as well as in rail and maritime, is expected, well targeted according to the specific conditions of each city and region in a liberalised transport markets, with fair competition. Moreover, technological improvements in all sectors must be encouraged by public R+D support. Safety, especially in roads, remains the fundamental cost associated to transport activities.

Tab. 2.3.1 Comparison between the main policy-aims of White Book 2001 and the 2006 revision



While the 2006 revisions maintained the same TEN-T and infrastructure priorities, it is likely that in 2010 the new White Book will also modify them in line with the new policy-aims. In particular, it is expected that from current TEN_T a selection of those corridors with highest European interest will be retained as potential "Core Networks".

The objective of TEN-T policy is to establish an infrastructure network covering all modes, ensuring sustainable mobility and providing efficient and high quality infrastructure for the growing transport flows. The networks shall potentially be economically viable on the basis of a socio-economic assessment. The corridors will connect the EU member states and link them to the neighbouring countries and other major trade partners. The corridors will have the major future traffic flows for either freight transport, passenger transport or both.

The criteria being applied to define TEN_T include, all considered, the following aspects:

Importance for the single market:

- Reduce the economic differences between countries in terms of GDP per capita
- Reduce differences in unemployment
- Develop the production structure towards more equal conditions in EU
- Easy access between production and consumption areas
- The absolute traffic flow in the corridor divided by passenger and freight flows
- The share of the traffic flow which has origin or destination within EU27
- Transit traffic
- Current and potential future import and export from a region
- The full logistic chain through the corridors for selected commodities
- The competition between modes in the corridors

Importance for territorial cohesion

- Efficient transport networks
- Easy access across borders
- Areas with low accessibility within EU and the neighbouring countries
- Potential for development of new tourism activities

but also

- environmental impacts
- impacts on landscape and sensitive areas

The policy alternatives to be assessed by the present project will concern:

- an alternative TEN-T network system to be specifically defined, and
- some selected behavioural, supply and demand-oriented policies.

Concerning the infrastructure networks, networks will include:

- Road network
- Railways dedicated to freight traffic
- Railways dedicated to passenger traffic
- Road pricing policies to avoid congestion

Networks will cover both EU-25 and neighbouring countries, including Northern Africa and Middle East.

Policy measures will comprise a mix of behavioural, supply and demand measures (road pricing simulations, etc.).

Nowadays, a number of studies and research projects launched by DGTREN are defining and evaluating transport policies and new TEN-T corridors at EU level, among others TransVisions (scenarios 2030-2050) and TEN-CONNECT. Cohesion impacts and explicitly included in these studies. Needless to say, it is not the purpose of this proposal to repeat already existing studies but integrate all available results into TEQUILA evaluation framework to carry on a territorial strategic assessment and derive conclusions concerning the improvements TEQUILA needs to become an standard fully operational methodology.

Discussions between decisions-makers and stakeholders are mostly channelled throughout the TEN Committee, where members from all Member States participate. The drafting of the Green Book of Transport, preliminary to the White Book 2010-2020 will start next summer, and the open consultation process will likely run along 2009.

It is therefore of major interest to apply TEQUILA framework, a territorial impact assessment developed in ESPON, to assess the territorial impact of these new European transport policies and plans, taking advantage whenever is possible of reference data and forecasts coming from already existing or ongoing studies in the field.

2.3.2 Existing methodologies and applications to the EU case

Transport infrastructure projects, and transport policy, is a policy-area were strategic assessment is of paramount importance; therefore, a number of strategic evaluation methods are being applied, from classic economic impact to more recent strategic environmental assessment:

- Strategic Environmental Assessment is mandatory for large projects and plans, in order to compare alternatives. Results on single impacts are presented and aggregated using MCA structures; compensatory policies can be designed. EIA methods are applied only at project level, deriving mitigation policies.

- A wide range of economic assessment methodologies exists and are being applied at EU level, developed both by individual countries and through earlier work undertaken for the Commission. Examples of the latter include projects such as EURET, EUNET, TRANS-TALK and HEATCO. A common feature of the more advanced procedures is

the combination of a cost-benefit analysis (CBA) perspective with explicit identification and (usually) numerical assessment of a range of other social, environmental and policy impacts in a formal assessment framework. Most European countries apply a logical framework approach to transport decision making – e.g., the New Approach to Appraisal (NATA) of the UK Department of Transport. In all cases, a core component is a CBA, integrated in the following ways:

- Cost-benefit analysis plus simple reporting of other impacts

- Cost-benefit analysis plus a application of a formal Multi criteria analysis (MCA) model with weights attached to different (non-monetised) criteria

- CA incorporating a CBA indicator (typically npv) as a criterion

- Stakeholder preference mapping (see IDM report for the Nuclear DeCommissioning Agency) which is essentially MCA using a range of different weight sets to reflect the potential stance taken by different stakeholders on a project's desirability, depending upon their 'world-view' regarding the importance of different criteria (e.g., strongly environmentalist; financial; social development, etc.).

TEQUILA can be understood as an evolution of these methodologies (as a MCA integrating CBA), taking all territorial aspects into consideration. In order to be applied, data from simulation and forecast models are needed.

Advanced tools to carry on sound specialised analysis are already available from both ESPON and DGTREN, to define reference scenarios, produce traffic forecasts and carry on socioeconomic and environmental strategic evaluations (see Fig. 2.3.1). A number of advanced transport forecast models are available from DGTREN, and regularly used by consultants and researchers: TREMOVE and Transtools. While TREMOVE is focused on energy impacts, Transtools is able to produce traffic forecast for all modes at network level.

On the other hand, during ESPON 2006, a number of useful tools were developed, with a more territorial-oriented approach, integrated in order to produce forecasts on impacts on a number of economic and environmental indicators: the MASST demographic and economic regional model and the KTEN passenger and freight transport forecasting model (ESPON 3.2. project).

On the basis of existing results from previous ESPON projects and of synergies with other studies at present being carried out for DGTREN, the following policy aspects and alternatives will be considered, and specific territorial impacts defined through the use of quantitative simulation models and software available by Subcontractor 1 of Leading Partner:

TRANS-TOOLS is the best state-of-the-practice transport-oriented forecast model available at EU level, currently being used in the TRANSvisions and TENCONNECT studies by DGTREN.

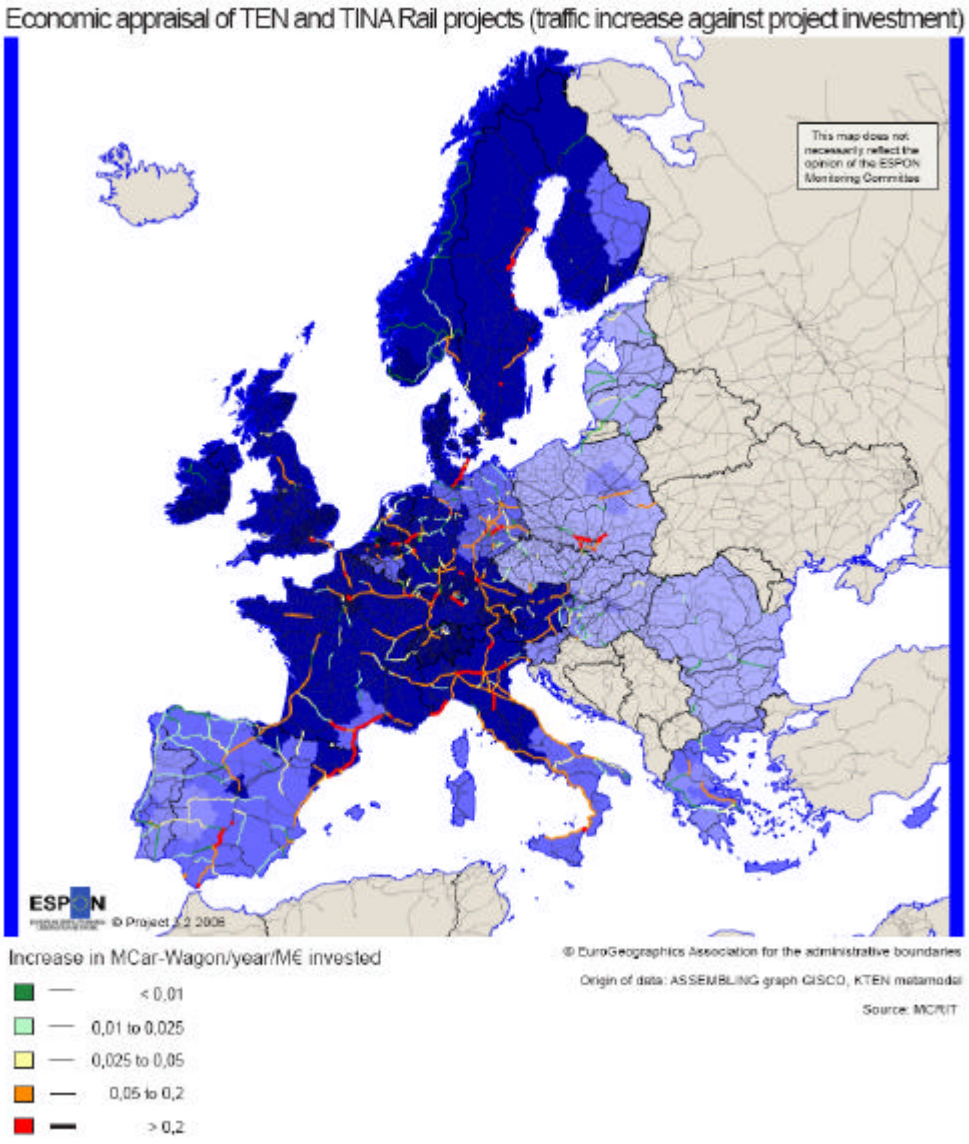
The modelling capabilities of TRANS-TOOLS are related directly to input variables describing the infrastructure networks and aspects related to the networks as e.g. transport costs or transport times. Therefore, the TRANS-TOOLS model is also able to offer answers on policy questions indirectly affecting transport costs and transport times, calibrated for a short-term period.

Each relevant policy variable has being scrutinized and the effect on the variables used as input to the TRANS-TOOLS model established. A list of possible policy actions to be analysed are being developed in close co-operation with the Commission.

As the analysis is focused on transport policy, the most direct indicators of policy effects consist of variables like:

- *Transport performance* (passenger-km, tonne-km, vehicle-km, etc.); (at EU, national and NUTS II level, on annual basis or more detailed).
- *Modal split* (share of demand using road modes, rail, air, etc.) both with reference to passengers and tonnes and to passenger-km and tonne-km, thus also *average distance* of transport can be assessed.
- *Load on corridors* (passengers and freight vehicles) and, therefore, levels of congestion on road infrastructure (TEN-T and main national links), and also, annual averages, and if available, daily peaks.
- *Fuel consumption.*
- *Emission levels* for CO_2.
- Change of *Gross Domestic Product* of regions;
- Change of *employment levels* of regions.

Fig. 2.3.1 - Example of an Economic appraisal (CBA-proxy), of TEN and TINA Rail projects, using KTEN and MASST results in ESPON 3.2



All indicators will be available both at the aggregate level and by country or, where significant, at more detailed geographical level.

Databases and results from TRANSTOOLS are indispensable to get consistent forecast for short-term horizons for key variables, but these tools have been complemented by other quantitative tools to carry on the forecast and normative backcast long-term exercises (up to 2050).

2.3.3 Transport policy aspects considered and expected results

The territorial impact analysis of European transport policies to be carried out is defined at strategic level, at long-term horizon, covering a package of infrastructure, behavioural, supply and demand policies.

Alternative impact analyses could be:

- Ex-post Territorial Impact Assessment of the 2001 White Book of Transport
- Ex-ante Territorial Impact Assessment of the Green Book of Transport main principles (to be published by DGTREN during 2008, first ideas available from summer 2008)
- Ex-ante Territorial Impact Assessment of the alternative Trans-European Transport "Core Networks" (to be studied by DGTREN during 2008 and proposed in 2009).

Since the new European transport policies are still not defined by DGTREN neither discussed and approved by Member States, the approach chosen for this exercise consists in defining a possible future configuration of such policies, not necessarily the most likely one but the most interesting alternative to provide useful insights to DGTREN from a territorial point of view, and also to test and improve TEQUILA methodology.

From this assessment, that are quantitative single-dimension impacts forecasted at NUTS 3 level, a full Territorial Impact Assessment will be carried out in cooperation with the LP, according to the TEQUILA methodology.

Outputs also regard:
- Guidelines for using TEQUILA in both ex-post and ex-ante transport evaluation
- Adjustments and refinements to be introduced into the present TEQUILA framework, particularly in its modules for transport-policy and infrastructure project assessment
- User-guide and tutorial.

2.3.4 Possible involvement of experts

As happens in relation to the agricultural policies, this part of the project will rely on expert judgement both to indicate the relative importance and the potential impacts of a range of transport policy scenarios at a territorial level. It will use a combination of expert judgement and historical data to provide quantitative estimates of the impact of particular policy measures on single areas.

The discussion with experts will have two steps. The first step will consist in an in-depth discussion of trends, policies and likely impacts, and second one will be devoted to discuss the relative importance of the potential impacts being forecasted.

A workshop will be celebrated in Barcelona to discuss trends, transport policies and likely impacts. Previously, a questionnaire specific for each theme will be circulated following a Delphi a process.

The list below shows a number of key indicators for each drivers category and the related current reference values. Please give your best guesses of the most plausible evolution for the whole Europe at the year 2050:

Key indicators	Most plausible value at 2050
SOCIETY:	
Total EU population (493 millions)	
People > 65 old (16,7 %)	
Net migration from outside EU (1,4 millions)	
Urban population (80%)	
Teleworkers (10%)	
Tourists per year (190 millions)	
Single families (28,6%)	
Road fatalities (42.953)	
ECONOMY:	
Total GDP nominal (11.597 billions)	
Yearly GDP growth at constant 1995 prices (3%)	
$/€ exchange rate (1,56)	
Share of GDP in R&D activities (1,84%)	
Trade flows as share of GDP (63,3%)	

Tab. 2.3.2 Example of a quantitative scenario with Delphi inquiry
From Transvisions (EC DGTREN, 2008)

This exercise will be conducted with a strategic and future-oriented view, since impacts in transport policies need long-term horizons to be evident. A reference scenario will be defined based on the previously mentioned forecast exercises.

Next, a first set of trends to be validated, and integrated into a normative-baseline scenario, is introduced:

In Europe, population tends to be stable (in average terms, with important regional differences internally and also with neighbouring countries, in terms of external and internal migration), land-use and transport infrastructure are resilient structures with strong inertias (at least when observed at a macro scale), even economic cycles in mature economies seem relatively stable and social values change just slowly generating well known patterns of mobility demand (passenger and freight elasticities to GDP growth have not changed much in the last decades, so mobility decoupling from economic growth seems unlikely in the years to come), but there are important ongoing technological changes and many others breakpoints to be expected, in areas that influence directly transport, such as telecommunication (convergence of digital devices) and energy (the change from oil to biofuels of different generations, hydrogen batteries, and renewal sources), and also in other areas with indirect influence such as biotechnologies.

Even if we live the *End of History*, in liberal democracies, economically mature, each twenty years eighty percent of products and services are reinvented, nowadays there are more active scientists and engineers that in all the history behind us and technology will radically change job conditions (less job available in manufacture industries, more need for higher education and personal entrepreneurship), as well as cultural values, traditions and territorially-attached identity feelings. The world is becoming smaller: China and India will become dominant economic powers, and increasing trade is expected with Asia, while Europe becomes less industrialised, more service oriented, with increasing tourism, and more investment of EU companies abroad. Common environmental challenges become evident, being green-house emissions impact on global warming the key challenge, with explicit reduction thresholds agreed world-wide (50% reduction in 2050).

A major challenge ahead is therefore the capacity of European institutions to adapt themselves to both the changing global conditions of the planet and also at local and regional level. Environmental policies will likely become key thresholds to induce self-organisation and more sustainable and balanced development patterns. Some transport policies are increasingly difficult to be implemented, even if more private involvement and new financing and managing schemes are expected.

2.3.5 Definition of methodology for forecasting the European impacts of transport policies

The methodology to be actually used will be based on updating existing forecast and backcast models available at EU level (e.g. KTEN, Transvisions fore&backcast metamodels, TRANSTOOLS, and TREMOVE) according to the specific needs of this study.

The work to be carried out will be based on regionalising these transport models, which often do not consider regional differences explicitly.

For each region a limited number of policy-relevant indicators will be computed, based on the following ones (provisory list, to be further developed, including accessibility indicators and others needed for the comprehensive TEQUILA impact assessment):

Tab. 2.3.3 Variables being considered in Transvisions metamodels (DGTREN provisory, 2008)

Total EU 27 population	Persons
Total EU 27 population (1995=100)	Persons
Total EU population	Persons
Total EU population (1995=100)	Persons
New EU population (enlargements)	Persons
Economic Integration (0-1)	Coef 0 to 1
Economic Convergence (0-1)	Coef 0 to 1
Coef to traffic growth	Coef
Average number of people per household	Persons
%active (nowadays pop over total 15-65)	%
% employed	Employees
employed	Persons
R+D investment as %GDP	%GDP

K stock of private and public capital in M€	M€
Productivity as GDP/employed POP	GDP/emp
Total GDP	M€ c. Price
Total GDP (100=1995)	(100=1995)
GDP per capita current EU 27	M€
GDP growth 2005-2050 (1+%/100)	%
Basic elasticity freight/transportGDP	tons-km/€
Basic elasticitypax/transportGDP	pax-km/€
Elasticity freight corrected to enlargement	Coef
Elasticity pax corrected to enlargement	Coef
Total freight transport in 1000Mton-km	1000Mton-km
Total freight transport (100=1995)	(100=1995
Total local freight	%
Total long-distace freight	%
Total local freight	ton-km
Total long-distace freight	% ton-km
Road modal share longdistance in % ton-km	% ton-km
Rail modal share longdistance in % ton-km	% ton-km
Sea modal share longdistance in % ton-km	% ton-km
Air modal share longdistance in % ton-km	% ton-km
Road goods in 1000Mton-km local	1000Mton-km
Road goods in 1000Mton-km longdistance	1000Mton-km
Rail goods in 1000Mton-km	1000Mton-km
Sea goods in 1000MTon-km	1000Mton-km
Air goods	1000Mton-km
Total pax transport	M pax
Total pax transport	M pax·km
Total pax transport (100=1995)	(100=1995)
Total pax local %	%
Total pax longdistance %	%
Total pax local Mpax-km	Mpax-km
Total pax longdistance Mpax-km	Mpax-km
Road modal share local	% pax-km
Rail modal share local	% pax-km
Road modal share longdistance	% pax-km
Rail modal share longdistance	% pax-km
Air modal share longdistance	% pax-km
Road pax in 1000Mpax-km	1000Mpax-km
Local Road pax in 1000Mpax-km	1000Mpax-km
LongDist Road pax in 1000Mpax-km	1000Mpax-km
Rail pax in 1000Mpax-km	1000Mpax-km
Local Rail pax in 1000Mpax-km	1000Mpax-km
Longdist Rail pax in 1000Mpax-km	1000Mpax-km
Air pax in 1000Mpax-km	1000Mpax-km
Emissions (EU-15 for cars) long-dist	MTn
Emissions (EU-15 for cars) urban	MTn
Emissions (EU-15 for cars) TOTAL	MTn
Emissions (EU-15 for trucks) longdist	MTn
Emissions (EU-15 for trucks) urban	MTn

Emissions (EU-15 for trucks) TOTAL	MTn
Emissions (EU-15 for rail) pax	MTn
Emissions (EU-15 for rail) freight	MTn
Emissions (EU-15 for rail) TOTAL	MTn
Emissions (EU-15 for planes) pax	MTn
Emissions (EU-15 for planes) freight	MTn
Emissions (EU-15 for planes) TOTAL	MTn
Emissions (EU-15 for ships) TOTAL	MTn
Technology improvement coef	Coef
Emission (EU-15 for new trucks)	kg per vh·km
Emission (EU-15 for new HGV trucks)	kg per tn·km
Emission (EU-15 for new Vans)	kg per tn·km
Emission (EU-15 for new freight rail)	kg per tn·km
Emission (EU-15 for freight planes)	kg per tn·km
Emission (EU-15 for new ships)	kg per tn·km
Car occupancy in urban environment	Persons / car
Car occupancy in suburban environment	Persons / car
Emission (EU-15 for new cars)	kg per vh·km
Emission (EU-15 for new cars) long-dist	kg per pax·km
Emission (EU-15 for new cars) urban	kg per pax·km
Emission (EU-15 for new BUS)	kg per pax·km
Emission (EU-15 for new pax rail)	kg per pax·km
Emission (EU-15 for new planes)	kg per pax·km
Total greenhouse emissions calculated	MTn CO2
Total greenhouse emissions official	MTn CO2
Increase in relation to 2005 levels	%

2.4 Assessment of Common Agricultural Policies

2.4.1 The state of EU agricultural policy: alternative policy options

The Common Agricultural Policy (CAP) remains the largest element of the EU's expenditure, occupying just under half of the total EU budget. Historically this expenditure has overwhelmingly been devoted to market support, and EU farmers in addition have been supported by levies on imports which have raised the price that consumers have to pay for many food products (notably cereals, beef, milk and lamb). During June 2003 the most recent reforms to the Common Agricultural Policy were agreed, following the Mid Term Review (MTR) proposals of 2002 and the Long Term Perspective proposals published by the Commission in January 2003, and these are now taking effect. The main element is a single payment, decoupled from production, replacing the previous array of direct payments which had emerged since 1992 to offset the effect on farmers' revenues of reductions in market price support. The latest reform envisages agricultural spending remaining at roughly current levels. Expenditure from EAGGF (totalling €40.5 billion in 2000) consists of the following main categories:

a) intervention expenditure (€30.5 billion), mainly direct payments (€25.6 billion).
b) export refunds (€5.6 billion), necessary to sell highly priced EU production at the lower prevailing 'world' prices elsewhere.

c) rural development payments (€4.2 billion from the Guarantee Section, and a further €2.5 billion from the Guidance Section, including Leader).

It should be noted that such expenditure excludes the largest component of the support received by EU farmers in the form of the higher prices paid by consumers within the EU. This "Market Price Support" was estimated by OECD in 2002 to amount to €56 billion. This element is of particular interest not only because it is the largest component, and because it is less visible, but also because this is the major concern of our trading partners in the WTO.

The historical (and current) structure of the CAP and its instruments are largely non-territorial in nature. However, within the EU27, there is considerable heterogeneity in the dependence on agriculture as a source of employment, the productivity of the sector, natural production circumstances, pattern of agricultural structures and in the application of CAP (where there is some scope for national flexibility). As a consequence all CAP policy instruments, even those which are not territorially targeted, have differentiated impacts across space because of the wide range of contexts within which European farmers operate.

Against this background it is surprising that, below national level, the territorial impact of the CAP has largely been neglected by researchers and escaped from political discourse. The lack of knowledge and understanding of the role of the CAP in relation to rural development and cohesion is particularly noticeable in the context of recent CAP reforms and EU enlargement. Formally, Pillar 1 of the CAP (market support; 95% of the CAP budget) is not a cohesion measure and has not been required nor intended to support the EU's cohesion objectives, while Pillar 2 (Rural Development, consisting of 4 axes addressing farm modernisation, agri-environment, rural economies and LEADER; 5% of the CAP budget) is a cohesion measure. While the TIPTAP project will concentrate on some of the potential impacts of broad policy reform to the different axes of Pillar 2, it will also investigate the impacts of some possible reforms to the support elements of Pillar 1.

2.4.2 Existing methodologies and applications to the EU case

The territorial impact of the CAP and Rural Development Policy was addressed by the ESPON project 2.1.3. This was hampered by data deficiencies but nevertheless was successful in elaborating the distribution of CAP expenditure across NUTS3 regions of the EU15, in modelling the impact of the 2002 CAP reform proposals, and in understanding the effectiveness of the main strands of Pillar 2 through case studies and review of national evaluations (Shucksmith, Thomason and Roberts 2005).

Given the requirements of the project, data availability and the objectives of the overall ESPON programme, a two-stage method was adopted. In the first stage (year 1), a number of key hypotheses were developed regarding the territorial impact of the CAP and RDP. A key issue arising from this was the importance of differentiating between different types of policy instruments that comprise the CAP and RDP. This is because a) they have played a distinct role within the CAP reform process and b) because they include different objectives and are expected to have given rise to territorially distinct effects. In particular, it was found necessary to analyse separately "Pillar 1" and "Pillar 2" of the CAP, the former relating more closely to the production activities of farmers, while the latter is designated as the rural development pillar of the CAP. Within Pillar 1, it was felt important to consider separately the territorial incidence and impact of market price support and direct income payments while, in

addition to analysis of total Pillar 2 support, support via the LFA scheme and agri-environmental measures were also analysed separately.

Based on the hypotheses, statistical analysis (correlation and multiple regression) was carried out to assess the geographical distribution or "incidence" of CAP support and the extent to which changes in the CAP have been associated with observable changes in the economic, social and environmental conditions in areas at the NUTS 3 level or equivalent. This was augmented by findings from previous studies drawn from across the EU considering the spatial effects of the CAP and RDP. In order to study the potential territorial impact of the MTR proposals, results from an existing agricultural policy model, the "CAPRI" model were apportioned from NUTS 2 to NUTS 3 level and then analysed, using mapping and linear regression techniques, with respect to the EU's social and economic cohesion objectives.

2.4.3 Definition of policy alternatives to be considered

CAP policy presents a double problem for this research project:

- the 2003 reforms are only now being implemented in member states, and further fundamental reforms are under discussion with many policy options left open;
- wide discretion is given to member states in relation to the mix of policy measures under Pillar 2 in particular, and to the allocation of funds across the four policy axes.

Therefore, in terms of looking ahead to the forthcoming CAP Health-check, to the budget review in 2009, and especially to discussions on further major reforms of the CAP from 2013, it will be necessary to build into the study a review of proposals under consideration in discussions with decision makers (see below). Notwithstanding this, the focus of the TIPTAP project's testing of the TEQUILA model's application to the CAP will be on expenditure between the different regions and across different policy headings. If the model is calibrated in these respects then it will be possible to consider the territorial impacts of a useful range of policy scenarios, including some which are more or less realistic and also some more extreme scenarios which will illustrate the implications of more radical and fundamental policy options.

Focusing the testing of the TEQUILA model on the distribution of CAP expenditure across NUTS 2 regions according to Pillar 1 and the principal axes of Pillar 2, as we propose, will allow us to examine the territorial impacts of a variety of policy options. Given the relatively short length of the project and the resources available we will only be able to look at a subset of the large volume of possible scenarios. Our current plan is to investigate as many as possible of the following list of policy scenarios as time and resources (including the availability of relevant data at NUTS 2 level) allow.

- Altering the balance of expenditure between the four axes of Pillar 2, either for the EU as a whole or on a country by country basis to reflect greater national flexibility;
- Altering the EU-wide rate of compulsory modulation, ie. transferring funds from Pillar 1 to Pillar 2, and whether or not additional voluntary modulation is permitted and adopted;
- Allocation of the RDR budget to Member States according to criteria of *relative needs* for rural development and/or environmental management, rather than on the current historic basis;
- Further liberalisation and market orientation of CAP;

- Degressivity (phasing out) of the Single Farm Payment after 2013.

While this does not cover the full range of policy options under consideration at the present time, this offers a powerful set of territorial impact assessments within the context of a small one-year project whose primary purpose is the development of a Territorial Impact Assessment model, rather than a comprehensive assessment of the territorial impact of CAP reform per se.

Territorial impact can therefore be assessed for a variety of reform options to Pillar 1, the four axes of Pillar 2, and for the CAP as a whole, in terms of reallocations or changes to expenditure.

It is envisaged that a number of different scenarios will be developed, with guidance from policy experts (see below), encompassing different allocations of funds among the Pillars and Axes, and among member states, in ways which would help decision-making during CAP reform discussions.

2.4.4 Possible involvement of policy experts

As mentioned previously this part of the project will rely on expert judgment both to indicate the relative importance and the potential impacts of a range of agricultural policy scenarios at a territorial level. It will use a combination of expert judgement and historical data to provide quantitative estimates of the impact of particular policy measures on single areas. The methodology will be achieved by a number of steps. First, a common framework will be developed for characterising policy objectives. Panels of experts, mostly recruited from within our own research centres and our European collaborators, will then be used to predict the performance and impacts of policy instruments and measures that contribute to specified objectives. As such, policy experts will be an important part of this study and their expertise and knowledge form a crucial resource for the methodology to be deployed.

2.4.5 Definition of the different impacts considered: logical chain from action to impact

The different impacts to be assessed in these projects will be determined following a thorough review of the agricultural policies to be considered. The objectives of policies and the related measures and instruments used to implement them will yield a set of measureable targets and objectives against which their success can be judged.

The relative importance and the potential impacts of selected policy measures will be assessed using an expert panel approach (see 111.4.F). At present it is anticipated that the impacts of agricultural policy will be assessed across the following four dimensions (though these may be amended during the initial phases of the project):

- farm impacts (e.g. on-farm employment, production, revenues, etc.);
- environmental impacts (e.g. pollution, uptake of agri-environment schemes);
- landscape impacts (e.g. changes in land cover or land use, etc.); and

- society/culture (e.g. measures of social capital; conservation of culturally important land).

The logical chain in each of these impact assessment exercises will begin with the identification of how policies will be implemented within the different territories. The potential scope of the impacts of this implementation at territorial level will then be predicted for each of the four dimensions outlined above (e.g. negligible, low, medium, high). Differential impacts will reflect the different physical and resource conditions in each territory, the prevailing land use and the implementation of agricultural policy at the territorial level. Following this scoping exercise a combination of historical data and expert judgement will be used to derive the required quantitative indicators for each dimension within a single territorial area. (probably at the NUTS 2 level). This process will reflect both the existing characteristics of the area and indicators of the previous impacts of previous relevant policy measures.

2.4.6 Definition of methodology for assessing each impact

Any policy evaluation requires the collection of relevant information and data to help assess the extent to which the expected targets and objectives of a policy have been or are likely to be achieved. Policy evaluation cannot be undertaken unless these targets and objectives are clearly understood. Similarly, inadequate information on the relative priority of policy objectives will also limit our ability to evaluate policies that have multiple objectives. Unfortunately, in most cases our knowledge of future policy scenarios and their implementation is insufficiently detailed to allow evaluators to assess precisely what objectives are to be addressed, how they are to be addressed, and even whether or not they are the correct objectives (Finn *et al.,* 2008). To overcome this problem in respect to agricultural policy (particularly post 2013) this has led us to decide to examine some more extreme or generic policy scenarios for agriculture and rural development. The use of more extreme scenarios will allow evaluators to more clearly identify potential impacts and for these to be measured with respect to the relevant dimensions of the Tequila model.

Given the uncertain effectiveness of future policies, expert judgement should be used to forecast the potential impact of specific policy scenarios. These predictions, in conjunction with relevant historic and sectoral data, will be used to derive quantitative indicators of performance that will provide an illustration of the specific impact of a policy on a single territorial area. It is anticipated that, in many cases, existing values of relevant indicators of past policy performance may not always be available at the required territorial scales to inform our analysis of future policy impacts. This may be due to the fact that it has not been collected at an appropriate scale, may be out of date or not collected at all. Where available, these data would provide an objective historical benchmark against which to base the quantitative estimates of the impacts of our policy scenarios against the policy dimensions outlined in the previous section. Where historic data are not available, expert judgment alone will be used to predict the general impact of policy on agreed indicators.

In the early stages of the project we will evaluate the usefulness of a range of sources of economic, landscape, environmental and social indicators across the European states considered by this project. Relevant data can be obtained from a variety of sources many of which relate to existing EU-funded initiatives. Data availability for non-EU states under

investigation by this project is likely to be less satisfactory and this may lead to an increased ned for the use of expert judgement to assess the likely impacts of agricultural policies within these countries.

One obvious data source is the Farm Accountancy Data Network (FADN). The FADN collects accountancy data from over 60,000 agricultural holdings in the EU. This data is harmonised and representative of the commercial agriculture holdings within the EU. It tends to relate only to holdings of a commercial size but can be classified across different enterprise types and holding sizes (measured by ESU). It includes data on labour, fixed assets and other inputs, outputs, income, subsidies, investment and loans. Other data on economic accounts, farm holdings, agricultural process and products can be accessed via the EC Eurostat site (http://epp.eurostat.ec.europa.eu/). EU data is not, however, comprehensive and organisations such as the FAO have noted that the EU does not require Member States to collect data on land prices, numbers of transactions or rents. The EU has published some data on rents and land prices in the pre-2004 Member States (Eurostat, 2000), but these are not comprehensive in coverage or collected in a standardized way.

A further useful source of background information is research commissioned by the Dutch Council for the Rural Area (RLG), based on a combination of literature reviews and written evidence from a wide range of individuals based within the European Environment and Sustainable Development Advisory Councils (EEAC), government agricultural offices and national ministries. The associated website provides of a series of factsheets containing background information about the current state of CAP implementation (both first and second pillars) across the 27 Member States. In addition, the factsheets identify key implementation issues and provide an overview of views at Member State level on the role of the CAP beyond 2013 (see http://www.rlg.nl/cap/methodology.html). Useful information on the direction of future policy and the effectiveness of current policy may soon be available following the recent CAP Health Check.

The ESPON database also holds some relevant information at NUTS 2 and NUTS 3 levels as well as information about other useful datasets at a variety of spatial levels. These datasets can be identified using the ESPON Data Navigator, which provides an overview of the main data sources in European countries at European, national and regional levels. Themes covered by the Data navigator include agriculture, environment and land use as well as a number of others relevant to the social and economic situation at a regional level. Other databases available here are the products of previous ESPON projects such as ESPON project 2.1.3 as mentioned earlier (NUTS 2 level) and ESPON project 1.1.2 on land use (NUTS 3 level).

Various other sources of data may be available to help assess impacts of policy on landscape and environment. For example, the EU funded EBONE project (http://www.ebone.wur.nl/UK/) is attempting to provide a data collection system for biodiversity including extant data, both past and present, at national, regional and European levels. It will form the basis for the continued development of a European Biodiversity Observation System and in this way provide a common European basis or reporting on biodiversity. This project will link into many existing databases but unfortunately much on the relevant data will not be available until after the end of this project and much of that will be based on a European Environmental Stratification based on physical indicators rather than administrative classifications.

Another EU-funded initiative GMES (Global Monitoring for Environment and Security) (known as Kopernikus from September 2008) has financed IMAGE2006 a pan-European

multi-data satellite image coverage for the three years around 2006 (http://www.gmes.info/). This information has been used in a number of European countries to derive high quality land cover maps (e.g. Land Cover Map 2007 in the UK) and the European CORINE Land Cover (CLC) map for 2006 will be based on the IMAGE2006 dataset. Production of CLC2006 is directed by the European Environment Agency (EEA) in cooperation with member states (http://reports.eea.europa.eu/COR0-landcover/en). The developing nature of these initiatives will mean that land cover data is more readily available from more historical sources such as the CLC 2000 and IMAGE2000 projects. Spatial references at either NUTS 2 or NUTS 3 level are available within the CLC2000 data base and have been used in previous spatial analysis. These data sources should provide good coverage

EEA are also involved in gathering other data on land use in collaboration with the European Topic Centre - Land Use and Spatial Information (ETC-LUSI), an international consortium assisting the European Environment Agency (EEA) (http://terrestrial.eionet.europa.eu/). ETC-LUSI is part of the European Environmental Information and Observation Network (EIONET) a partnership network involving over 300 institutions and 900 experts providing information on the state of the environment in Europe (covering 37 European nations) (http://www.eionet.europa.eu/). Among other things EIONET collects information on air quality, water quality and biological diversity with resources for mapping and geospatial data handling. Again it may not always be possible to obtain data at a spatial level relevant to the Tequila model.

LUCAS (Land Use/Cover Area frame statistical Survey) was commissioned by Eurostat as an area frame survey based on the visual observation of a sample of geo-referenced points, that attempted to provide representative and harmonised estimates of land cover and land use at EU level (Martino and Fritz, 2008). LUCAS was first implemented in 2001 in 13 EU Member states. An improved survey was carried out again in 2003 in all EU Member States (15) plus Hungary. A new survey was carried out in 2006 in 11 states, with an extended survey of 13 states in 2007. Data precision is expected to be very high for main categories of land use such as wheat, cereals, arable land, permanent grassland, permanent crops, forests, and urban areas. In addition the master sample has been intersected with NUTS2 boundaries to extract points at a territorial level and allocate them by country, While this methodology is helpful to territorial impact assessment its usefulness is reduced by its limited geographical coverage.

2.4.7 The territorial level considered

Many indicators of policy performance have been suggested in the literature and in EU funded studies such as Seamless. Most of these indicators are based on farm-level data that are readily available. For example, within the EU, the FADN is a useful source of farm-level economic and social data at regional, national or EU levels.

The problem with these and other sources of quantitative data is the spatial scale at which they are kept. For example, FADN data is often aggregated at a level even greater than that corresponding to NUTS1 areas. Other economic, environmental and social indicators may be available at a range of scales but in some countries will not exist below NUTS1 or NUTS2 level. As noted in the previous section other useful data may be aggregated using typologies based on other factors, though in many cases the availability of digital data might allow some insights to be drawn at a territorial level.

Therefore while it is possible to collect qualitative data based on expert judgement at NUTS2 and probably NUTS3 levels, it would be harder to find reliable existing sources of comparative objective quantitative data at these levels. However, to inform our *ex ante* assessment it may be possible to use FADN data at NUTS1 level or greater and model it down to NUTS2 level using available national statistics from each country on the distribution of farm enterprises. This can then be used alongside expert judgement to inform the estimation of quantitative indices.

2.5 Towards TEQUILA 2 Operational Model

TEQUILA 1 model was operated though a software package called TEQUILA SIP: Interactive Simulation Package. TEQUILA 2 will utilize the same package, substantially reconsidered and enlarged.

First of all: The SIP was conceived as a tool for the general territorial impact assessment, what in this project is made reference to as Summative Impact (SI). This structure will be maintained, but it will be accompanied by a simplified package for Single Dimensional Impacts SDI (on competitiveness, economic and social structure, environmental aspects, etc.). In this case, all problems connected with value judgements on the relative importance of the different dimensions/criteria (economic vs. environmental vs. social vs. cultural, …) are not present by definition.

In all cases, even in SI assessment, the impacts on the single components of the summative impact will be treated and shown separately.

Second: the new operational model will integrate mapping procedures directly inside the computational machine, in order to avoid transfer procedure from impact calculation to impact mapping.

Third: as the general procedure will consider the case where compensation among impacts could not be acceptable (the Flag model), devices for showing this result in the single regional cases will be included (both in the listing of results and in mapping).

Fourth: the research project will try to include interregional spillover effects: via interregional economic interchange, via hydrological network for water pollution, via wind transmission of air pollution, via traffic diversion on the transport network, etc.. In the first case, the MASST model developed by the Politecnico di Milano unit will be utilized, as it estimates empirically these spillover effects (though in a NUTs 2 framework); in the last case, the KTEN model will try to simulate the expected interregional effects on the transport network; in the other cases, ways of simulating proximity spillover effects will be explored.

The operational model will include these effects, whenever estimated in a sufficiently sound way.

3 ANALYSIS OF THE RELEVANT LITERATURE

3.1 A review of the literature about territorial impact assessment methodologies and applications

Territorial Impact Assessment (TIA) was authoritatively proposed in a EU context by the ESDP (CEC-CMSP, 1999). In fact, the multidimensional nature of EU goals (from economic and social cohesion, to environmental protection, to cultural development of populations) calls for new planning concepts and integrated assessment tools, identified in the TIA.

In the ESDP words:

- (138) "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 for people are taken into consideration equally. Spatial and environmental impact assessment can provide the necessary information basis for this";
- (139) "New approaches should be taken to harmonise nature protection and spatial development";
- (Policy option 29) " Introduction of territorial impact assessment as an instrument for spatial assessment of large infrastructure projects (especially in the transport sector)";
- (Policy option 42) "Preparation of integrated spatial development strategies for protected areas, …, and areas of high biodiversity such as coastal areas, mountain areas and wetlands, balancing protection and development on the basis of territorial and environmental impact assessment";
- (Policy option 52) "Application of environmental and territorial impact assessment for all large scale water management projects".

The term "territorial" looks quite as a neologism in the English language and planning practice, and derives from the latin countries approach ("pianificazione territoriale", "aménagement du territoire") where territory, different from abstract "space", is considered as a multidimensional concept integrating geography, history, society, environment, landscape, economy and what is increasingly called "relational capital". Similar meaning is also present in the German language and planning tradition, where terms like Raum/raumlich consider space under a much wider perspective than the pure physical one.

A second element worth a consideration is the fact that the official Strategic Environmental Assessment procedure (ECE – DGXI,1998; Eggenberger M., Partidario M. R., 2000), enforced for all projects and programmes under support of the Structural Funds by the Commission and similar to a possible TIA – for its long term approach, for its effort to widen a purely environmental perspective – is hardly quoted in the document, and probably judged still too "sectoral".

At the first Ministerial Meeting of the Spatial Ministers of the EU after the approval of the ESDP, In Tampere, October 1999, Ministers agreed on a ESDP Action Programme with three Strands of Action. Inside the first strand, addressed towards the promotion of a spatial dimension in national and community policies, there was an action towards the development of a Territorial Impact Assessment procedure, justified in the following way (CMSP, 1999):

"The development of a common concept for TIA is necessary in order to support spatial development policies. The concept should bear a cross-sectoral nature and include socio-economic, environmental and cultural indicators for the territories in question. A further clarification effort should be devoted to the linkage between TIA and SEA – Strategic Environmental Assessment". The task was assigned to the future, and now existing, European Research Network called ESPON.

The task of devising a TIA methodology was subsequently taken up by the Committee on Spatial Development and by a special informal sub-committee, starting 2000. In one of the early (but almost unique) reports, TIA is defined as "a tool for assessing the impact of spatial development against spatial policy objectives or prospects for an area", working at "any spatial scale" and therefore applicable to large projects, plans and programmes (Williams et al., 2000).

Here one can find one of the roots of the present methodological proposal, linking TIA to "spatial policy objectives", and in particular to a definition of territorial cohesion (Camagni, 2007). Evidence from the experience of European countries in developing methodologies that, in the spirit if not in the terminology, were similar to the TIA were collected by the already mentioned sub-committee, and presented in some working meetings. A tentative collection of international experiences is made in Camagni, 2003, ch. 7., and a full proposal for a TIA to be applied to specific plans/programmes in single regions on the basis of a multi-criteria approach in Camagni, 2007, ch. 8[13].

As explained before, the proposal of the Commission for an integrated Impact Assessment of EU policy measures, referring to the aggregate EU territory (CEC, 2002, 2004a, 2005b) follow the same general logics of a multi-dimensional, non-sectoral approach; in methodological terms though, the consequent empirical works that were carried out do not help much in the frame of the present proposal, en explicit territorial dimension being absent.

Inside the ESPON 2006 programme, the task of reflecting on a TIA methodology, both by a theoretical (top-down) and an empirical (bottom-up) approach was taken up first of all by ESPON Project 3.1, where a "minimum requirement" or common denominator for any TIA experiment was produced.

The minimum requirements were listed as follows:

Scoping

a. What is causing the impact?
b. what is changed by the intervention?
c. which territorial level of observation?
d. what has happened, what may happen in the future?

Analysing

e. what output is registered, measured, appraised?
f. what is the topic described, by which indicator?
g. which political goals and orientations are referred to?
h. how is the analysis performed?

[13] A concrete application of this methodology was made with reference to the Minerals Extraction Plan of the Trento Province, considering different aggregations of municipalities; see: Camagni, Pompili, 2006

Concluding

i. what is defined as “territorial”?
j. j. what do the results look like?

This minimum requirement list looks crucial and reasonable. In our methodology, we take care of each of these elements, namely:

a. the what: it is indicated explicitly in bot cases of CAP and transportation assessment;
b. cause effect logical chains: are sections in the presentation of both assessments;
c. territorial level: Nuts 3 level is indicated as the more appropriate one, and Nuts 2 the only possible level for CAP assessment;
d. time perspective: when all policies inspected are completely implemented, with impacts at a definite moment in time (to be agreed with the ESPON MA;
e. output: quantitative impacts mostly; quantitative measurement in all cases;
f. indicators: will be clearly described;
g. goals: the ones encompassed by the territorial cohesion objective;
h. method: model simulation (transport) and quail-quantitative judgement (CAP);
i. territory: integrated socio-economic-physical-cultural-identitarian system;
j. results: let’s wait and see!

In many ESPON projects, empirical ways to simulate and assess territorial impacts (at least impacts on some sub-dimensions of the general territorial sphere) of EU policies were carried out. A list and a synthetic presentation of fields, methods and results is given in Tab. III.1: this tables builds mainly on a synthesis report made inside ESPON 3.2, adding more recent projects.

In the same ESPON 3.2 project the prototype TEQUILA model was presented and applied to priority TEN projects; these results constitute the main theoretical base of the present project.

Tab. 3.1 – Partial assessments of territorial impact of EU policies in ESPON 2006 Programme

PROGRAMME	TYPES OF POLICY INVESTIGATED	TYPES OF IMPACTS INVESTIGATED	LOGIC AND CAUSE-IMPACT RELATIONS	TECHNIQUE OF ANALYSIS	PERIODS OF ANALYSIS	TERRITORIAL REFERENCE OF OUTCOME
ESPON 2.1.1	EU transport and TEN Policy ICT infrastructure and its service	impact on GDP and accessibility Impact on GDP	Several specific models have been developed: _ SASI model (economic and demographic factors). _ CGEurope model (Computable General Equilibrium model) _ STIMA Model (estimation of a quasi production function)	Evaluation of several quantitative scenarios (10 for transport policies and 3 for ICT) Simulation models Classification of region case studies	1991-2001 (Ex post assessment) 2001-2021 (Ex ante assessment)	Maps on GDP and accessibility, making possible different territorial typologies.
ESPON 2.1.2	Develop 'typology' of regions in terms of R&D and innovation capacity Assess spatial distribution of R&D resources Assess impact on development.	How structural and R&D policies improve the R&D capacity of the regions	A. Identifying where funds are allocated. B. 1_ identifying spatial objective of the policy 2_ analyzing existing objectives 3_ identifying baseline conditions 4_ describing measures 5_ identifying other programme which have influences 6_ undertaking cumulative assessment C. Improvements identified _ Levels of R&D (to increase economic performance) _ Quality of R&D _ Promote commercialisation of R&D _ Capacity to lead R&D projects	A regression model (log-linear model) had been developed in order to understand relationship between funds and economic performance. Aggregate statistical analysis case studies	1994 – 2006 (Ex post assessment)	Quantified indicators at NUTS3 level, mainly analyzing expenditures and employees (plus education level of inhabitants).

PROGRAMME	TYPES OF POLICY INVESTIGATED	TYPES OF IMPACTS INVESTIGATED	LOGIC AND CAUSE-IMPACT RELATIONS	TECHNIQUE OF ANALYSIS	PERIODS OF ANALYSIS	TERRITORIAL REFERENCE OF OUTCOME
ESPON 2.1.3	Analyses of CAP and Rural Development Programme by analyzing expenditure of the DG Agri to firms.	The "policentricity" goal of the ESDP.	It is impossible to compare with a scenario without-CAP. A quantitative analysis (ex post distribution) and some case studies	Pilar 1 had been estimated in terms of GDP and social cohesion; Pilar 2 had been estimated in terms of subsidies received and the regionalization of the contributions (CAPRI Model had been used to analyse case-studies)*. ** (These methodologies had problems to identify cause-impacts relationships).*	1990-2000 Forecast using the CAPRI model	NUTS3 scale. Typology of regions
ESPON 2.1.4	Internal market for energy Environmental policy European Energy Charter	Effects of differentiated policy on economic and environmental aspects.	_ Investment _ Prices _ income transfer. Measure of the industrial and territorial impacts through energy prices.	Defining typologies of regions. Use an Input-Output model. Case studies for particular regions.	Simulation and sensitiveness to regions with static characteristics applying variation in the regulation	NUTS2 level. Typology of regions
ESPON 2.1.5	European Fisheries policy	Impacts on _ employment, social cohesion and demography _ regional economic strength _ environment and costal management	Economic performances related to specialization index and expenditure amounts	Quantitative analysis at NUTS2 level in order to analyse the income/ employment impacts. More in-depth analysis had been carried out in qualitative way (case studies).	Second half of '90s	NUTS 2 level *(severe constraints on data availability)*

PROGRAMME	TYPES OF POLICY INVESTIGATED	TYPES OF IMPACTS INVESTIGATED	LOGIC AND CAUSE-IMPACT RELATIONS	TECHNIQUE OF ANALYSIS	PERIODS OF ANALYSIS	TERRITORIAL REFERENCE OF OUTCOME
ESPON 2.2.1	Structural funds (SF)	Mapping SF and their contribution to on cohesion and policentricity development in spatial policies.	Distribution depends by structure of territories and policy design process Different forms of policy impacts on _ Territorial development _ Governance and policy development _ Causal links	A twofold approach 1_ mapping distribution of investments 2_ define territorial impacts Impacts are related with GDP increasing (no macro-economic analysis).	1994-1999	NUTS3 level. Typology of regions
ESPON 2.2.2	Funds for accessing countries (ISPA, SAPARD and PHARE).	_ Spatial cohesion _ Competitiveness _ Integration Measured in terms of changed in GDP pro capite and unemployment.	Analyses the different levels and sectors of intervention analysing economic impacts: in terms of income support, regional structures, horizontal and sectoral structures.	Integration of different methodologies, mainly focusing the inter-relationship between sectors. Quantitative analysis: correlation between estimated investments and GDP p.c. and unemployment rates; Qualitative analysis on several case-studies.	1998-2000	NUTS2 and NUTS3 level Typology of all regions
ESPON 2.2.3	Funds provided by ESF and ERDF, limited to urban context	Evaluate impacts as defined by programmes	Identification of objectives and measures and design of an appropriate methodology for follow sectoral policies: _ Industrial change _ Social sectors and HR _ Urban environment and transport _ Ecological environment	1_ Analysis of initial conditions and outcomes. 2.a_ Factor analysis to identify the determinants (mainly in terms of weights) of urban economic performance 2.b_ Regression analysis relating factors with different indicators of development.	1994-1999	NUTS3 level.

PROGRAMME	TYPES OF POLICY INVESTIGATED	TYPES OF IMPACTS INVESTIGATED	LOGIC AND CAUSE-IMPACT RELATIONS	TECHNIQUE OF ANALYSIS	PERIODS OF ANALYSIS	TERRITORIAL REFERENCE OF OUTCOME
ESPON 2.4.1	_ Strategic environmental assessment _ Habitats and bird directive _ Water framework directive Spatial dimensions considered _ civil protection _ biodiversity _ water policy _ cross-sectoral dimensions of SEA	Territorial efficiency Territorial identity Territorial quality	TEQUILA Model (ESPON 3.2).	TEQUILA model (non-regionalized impacts)	1990-2000	Aggregate EU territory
ESPON 2.3.1	Application of the ESDP	Application of policy options expressed by EDSP _ Sectoral policies _ INTERREG programmes _ Tampere ESDP action programme _ CEMAT	Series of questioning to national experts regarding _ Planning tradition _ Application at different level _ Timing and importance of application _ Inter-regional differences	National reports and case studies	1999 up to present time	Qualitative outcome
ESPON 3.4.2	EU Economic Policy and location of economic activities	Economic performance and other innovative indicators of wealth and development _ economy, _ Lisbon performance, _ labour market, _ demography, _ natural hazards, _ technological hazards, _ accessibility	MASST Model	Quantitative analysis using econometric methods for macroeconomics development. The methodology is based on a sectoral typology of policies.	2000-2006	Key findings, messages, and recommendations, separately for each of the three levels

3.2 A review of the recent literature on MCDA, with reference to territorial impact studies

3.2.1 Multi-criteria evaluation methods

It has already been discussed in the preceding sections that the presence of externalities, risks, long-term effects, spatial spillovers, unreconcilable interests and qualitative information generally preclude a meaningful application of unidimensional evaluation methods such as CBA. Consequently, over the past decades attention has been devoted to the development of alternative evaluation methods, such as multicriteria evaluation methods. In the 1970s and 1980s an avalanche of multicriteria methods have been developed. A review of various types of multicriteria evaluation methods can be found among others in (Vincke, 1992; Zeleny, 1982).

An essential difference between multicriteria analysis (MCA) and CBA is that CBA takes consumer preferences as the starting point and tries to achieve market conformity. In MCA, the preferences of the main actor (often the government) are not modelled as the sum of individual preferences. Instead, the government is assumed to have its own preferences and responsibilities.

Rather than a specific appraisal method, MCA is a family of methods. This family comprises a collection of around one hundred techniques that share some basic principles, but differ in other, mainly technical aspects.

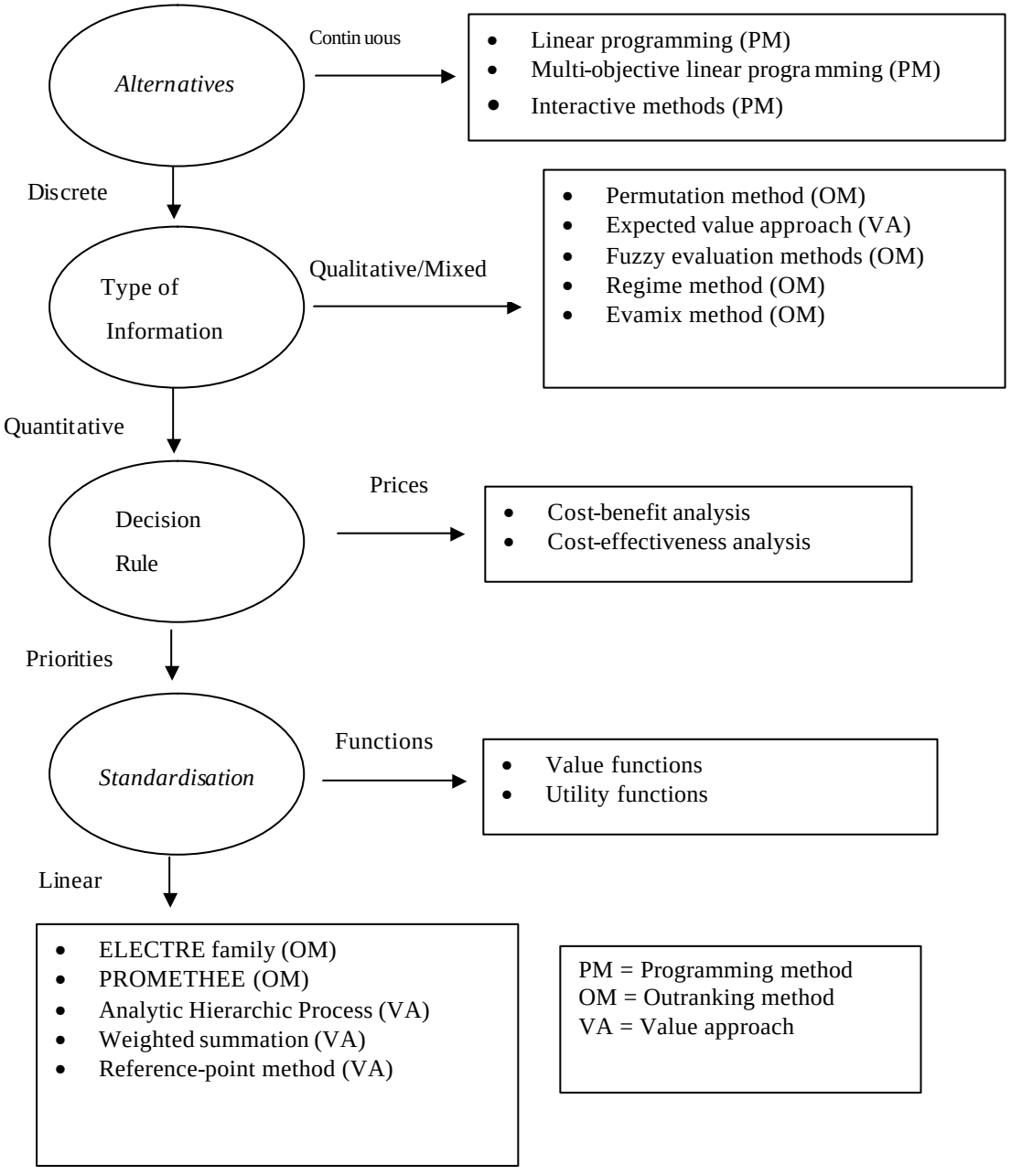
Janssen and Munda (1999) offer a typology of evaluation methods which helps us to classify methods according to various characteristics (see Figure 3.1). They based their typology on the following four distinctions:

1. *The set of alternatives: discrete versus continuous problems.* In evaluation practices, a distinction is often made between discrete and continuous problems. Discrete decision problems involve a finite set of alternatives. Continuous problems are characterised by an infinite number of feasible alternatives.
2. *The measurement scale: quantitative versus qualitative attribute scale.* Some problems include a mixture of qualitative and quantitative information. Qualitative and mixed evaluation methods can handle this type of information to analyse the alternatives. If the information concerned is not exact, fuzzy evaluation methods can be applied.
3. *The decision rule: prices or priorities.* The decision rule is unique for each method. Priorities used in MCA reflect the relative importance of the criteria considered in the analysis. In CBA, prices are used to calculate benefit-costs ratios. These prices are derived directly or indirectly from market prices or are assessed by means of various valuation methods.
4. *The valuation functions: standardisation versus valuation*. In order to make scores comparable, they must be transformed into a common dimension or into a common dimensionless unit. This can be done by transforming the scores into standardised scores by means of a linear standardisation function, or by using value or utility functions. Utility and value functions transform information measured on physical measurement scales into a utility or value index.

3.2.2 Applications of Multicriteria Analysis

Transportation planning offers a rich application field for MCA, as transportation evaluation comprises a variety of different policy perspectives, such as cost minimisation (either from the side of users of transport systems or from the side of governments investing in infrastructure),

Figure 3.1. A typology of evaluation methods (Janssen and Munda, 1999)



consideration of landscape values (e.g., segmentation, visual beauty), minimisation of ecological damage (protection of biodiversity, minimum noise annoyance or air pollution), maximisation of transport safety, or minimisation of traffic congestion. Many of these policy perspectives cannot achieved to the full extent simultaneously, as they may be more or less contradictory. Hence, they offer clear examples of a multiple criteria decision problem, for which MCA techniques may be helpful.

The fields of application range widely in transportation planning. They may concern supply side areas, such as the design or construction of new infrastructure or its embeddedness in local and regional landscapes. This supply side may refer to road transport (e.g., construction of motorways), railways (e.g., the location of new railway stations), aviation (e.g., the expansion of the number of runways at a given airport), etc. But the field of application may also concern the demand side, such as the optimal distribution of transport flows on the basis of various judgement criteria (user costs, environmental damage, etc.). So there is a vast application potential for MCA methods in the field of transport planning. The actual number of applications is formidable and even too large to summarise here. We will offer here a few references to the use of MCA in transportation planning.

Rietveld (1980) offers us a nice description of a MOP solution to a transportation network problem. The decision problem to be dealt with concerned the determination of the optimal pattern of home-to-work trips in a certain region. In his study Rietveld was able to:

- Analyse possible conflicts and compromises between goals;
- Calculate the values of the objectives;
- The intensity of traffic on the various routes included in the model;
- The unemployment arising in the various locations
- The probability that the pertaining solution is an optimal compromise.

Vreeker *et al.* (2001) illustrate the application of the discrete MCA Regime Analysis by means of the evaluation of development plans for airport expansion in the Maastricht area in the Southern part of the Netherlands (Vreeker et al., 2001).

Torrierri *et al.* (2002) used the multicriteria method Flag Model to reconcile transportation planning objectives with those of sustainable development. The case study presented is concerns a 'real-world' case concerning the design of a new road network in the area of the Cilento National Park in Italy.
The specific goals of the project were:

- integration of the communes inside the Park, in the main valley (valley of Sele)
- reduction in emigration
- preservation and increase in value of natural and cultural heritage
- protection of the environment.

By means of the Flag Model the authors were able to analyse to which degree each alternative contributed to the above mentioned objectives.

Other authors that were considered in building the methodology of this project, already presented extensively above, are: Owen J., Rogers P. (2000), Nijkamp P., Rietveld P., Voogd H. (1990), Nardini A., (1997), Osuna J. L., Màrquez C (2000) for multi-criteria analysis of policies and the construction of a methodology capable of integrating different approaches such as cost-benefit analyses, MCA, quantitative and qualitative impact judgements; OECD, 2005 for the construction and use of composite indicators.

3.3 A review of the literature about transport policy impact assessment

The literature about policy impact assessment applied to transport policies is very large, using different methodologies and analysing different scales. In the previous paragraph some references had been indicated, more recent prospective and strategic studies in the field will be studied.

Considering the impossibility to be exhaustive, in this section we will indicate a list of the most relevant studies including transport-policy scenarios assessment:

- Bertrand G., Michalski A., Pench L. R.,(1999) *Scenarios Europe 2010. Five possible futures for Europe*. EC Forward Studies Unit, Brussels.

- Curry A., Hodgson T.,Kelnar R.,Wilson A.,(2006) *Intelligent Infrastructure Futures. The Scenarios Towards 2055*.,UK Office of Science and Technology, London.

- ESPON 3.2 (2006), *Spatial scenarios and Orientations in relation to the ESDP and Cohesion Policy*, Third Interim Report January 2006, Volume VI on territorial impact assessment/analysis (TIA) (available on the ESPON website).

- EU Commission – DG Research (2007), *TRIAS Sustainability Impact Assessment of Strategies Integrating Transport, Technology and Energy Scenarios*, ISI, 6th Research Framework Programme.

- International Energy Agency (2008), *Forecasts for motor vehicle and oil demand to 2030 and 2050*, Paris.

- Joint Research Center JRC (2008), *Backcasting approach for sustainable mobility for 2050*, Ispra.

- Lejour A. (2003), *Quantifying Four Scenarios for Europe*, Den Haag CPB Netherlands Bureau for Economic Policy Analysis,

- MCRIT, (1997), *Union's Territorial Strategies Linked to TEN-T*, Report to DGTREN, Barcelona.

3.4 A review of the literature about agricultural policy impact assessment

The review of the literature was made inside section 2.4.

4 DATA AVAILABILITY

4.1.1 General overview

The main goal of the project is to develop a TIA methodology. The data needs refer to the project's main goals, namely:

- to define impact indicators starting from quantitatively defined policy interventions;
- to define the value function and the sensitivity/vulnerability function;

The Research group is already in contact with Claude Grasland (Université de Paris), charged of the ESPON database. The cooperation is assured by several partnerships in past projects among his research unit and the TIPTAP project partners.
This project will use two main database available:

- EUROSTAT
- ESPON Database

This data are official certified and easy to access. In this way, the TEQUILA Model will build only on official statistics in order to pursue the goal of 'transparency' in assessment methodology. Furthermore, some thematic database are available in order to focus the implementation of the TEQUILA Model on transport and agricultural policies. Specifically, the main database available are the following:

for transport policy

- DGTREN, Transport Pocket Book
- TRANSTOOLS (Transport multimodal networks)

for agricultural policy

- DGAGRICULTURE, FADN
- EEA, Corine Land Cover

Data availability for specific needs of the project was already inspected in section 2.

4.1.2 Data availability in non-EU27 countries considered by the ESPON network

The multicriteria methodology requires the integration between several different databases, as the ESPON Navigator Project provided in past years. The EU enlargement affects the availability of a complete database for new countries. The regionalised data are not always available at the required territorial scale (NUTS3). The first overview of the databases previously defined highlights relevant problems with reference to Iceland, Liechtenstein, Norway and Switzerland and even more problems about candidate countries, Western Balkans and Turkey.

This research project will explore the data referring to non-EU countries during the early next 3 months.

5 PROJECT ORGANIZATION, EXPECTED DELIVERIES AND DISSEMINATION PLAN

5.1 The general organization

The logical, organizational and temporal structure of the research work is presented in Tables V.1 and V.2.

The partners are assigned the following general tasks:

- LP: coordination, model concept, model building, construction of the operational package with Subcontractor 2 to LP, drafting of final versions of Reports (blue colour)
- P2: impacts of CAP policies (green colour)
- P3: improvement of the Multi-criteria concept and value functions (red colour)
- S1LP (subcontractor 1 to LP): impacts of transport policies (yellow colour)

Three main Work Packages are proposed, as suggested in the Terms of Reference, namely:

WP1: coordination (task of the LP)

The tight time schedule that is imposed requires a tight coordination between the project partners. Interactions between partners regard:

- full comprehension of the characteristics of the present TEQUILA model,
- full agreements on the substantial improvements in the general methodology, developed by LP and Partner 3, by partners working on the two impact themes (P2 and Subcontractor 1 to LP – S1LP);
- contribution of all partners in the logical structure of the TEQUILA 2 model;
- efficient division of labour in the definition and collection of relevant data. In principle: impact indicators should be collected by field partners (P2 and S1LP) while vulnerability and receptivity indicators could be collected by LP;
- interaction with DGREGIO for full agreement on content of policies to be assessed;
- precise timing in the delivery of results and Reports;
- participation in drafting conclusions and suggestions for future research.

All these interactions have to take place in due time, in order not to jeopardise the subsequent phases of the work.

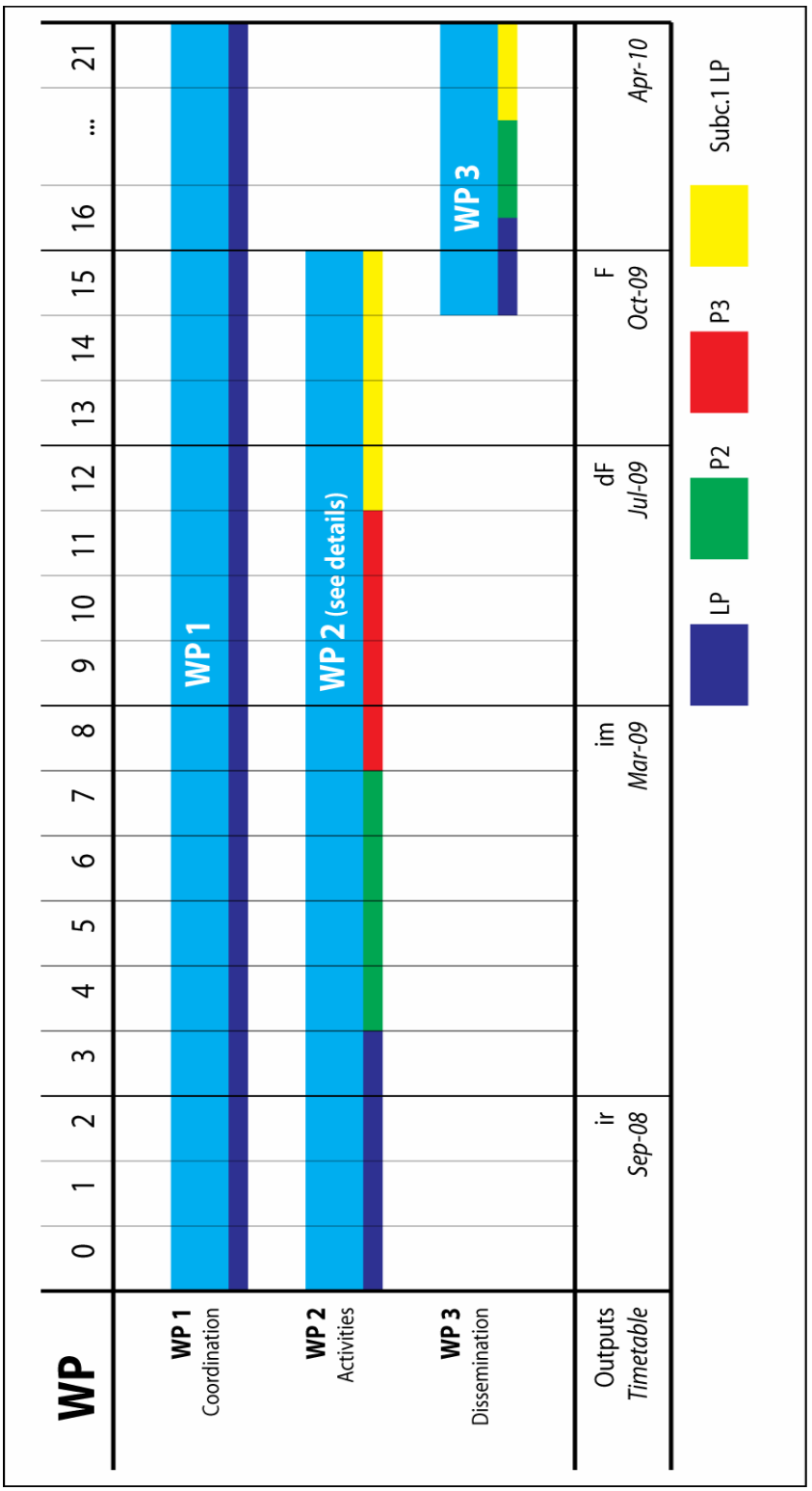
Coordination also regards the organisation of experts meetings and the circulation of financial reports.

Coordination will last the entire time span of the research.

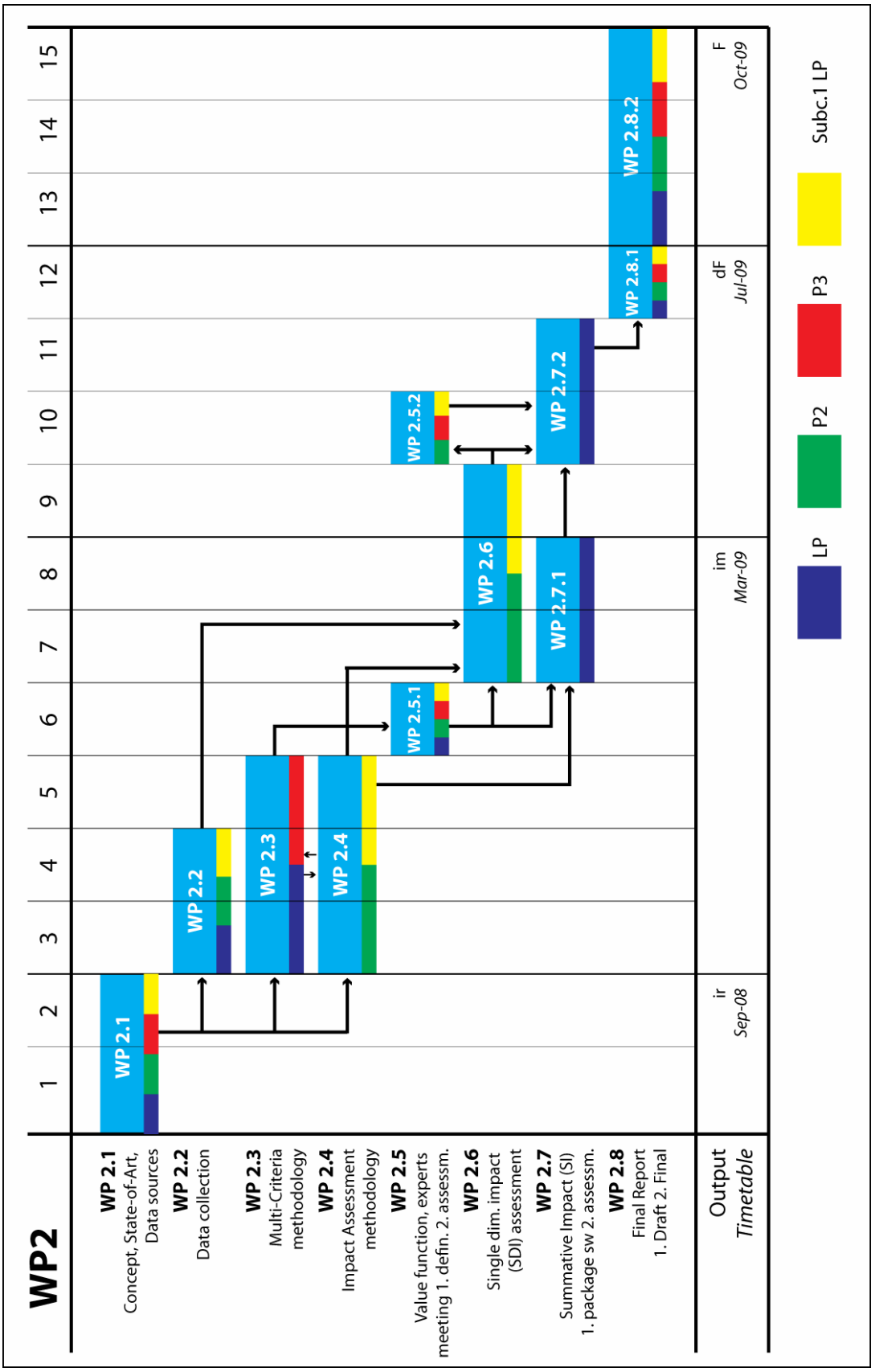
WP2: Activities (see details afterwards).

This task will last one year, July 2008 to July 2009 (Draft Final Report). Three more months will allow the preparation of the Final Report. All partners are involved (see table V.1 and V.2 and the following paragraph for further details).

Tab. 5.1 – Breakdown of the research work by work package and partner responsibility



Tab. 5.2 – Breakdown of WP2 "activities" by sub - package and partner responsibility



WP3: Dissemination (from September 2009 to April 2010)

The dissemination phase will host the following activities:

- presentation to the ESPON conferences
- presentation and discussion of methodology and results in scientific meetings, due to the methodological and innovative character of the entire research project[14]. A scientific workshop could also be organised in cooperation with the ESPON MC.;
- presentation of results at DG REGIO, and subsequently at DG TRAN and DG AGRICULTURE (if possible and if requested), with possibility of interactive change of some of the model parameters (weights, etc.);
- presentation of results at some national level, still with a comparative goal (results are relevant mainly in an interregional comparative setting);
- presentation and discussion of results in some regional cases where the FLAG methodology suggests a state of alert and limited possibility of trading/compensating among different impact dimensions.

Partners involved: LP, P2 and S1LP.

5.2 The scientific and research activities

WP 2.1. Concept, state of the art, data sources

All partners involved
Period: 2 months
End: Sept '08: all WP encompassed inside the present Inception Report

The first task to be accomplished in this WP is the full definition of the research concept, and in particular:

- characteristics of the methodology, strengths and limitations,
- aspects of CAP and Transport policies to be taken into consideration in defining territorial impacts;
- dimensions and sub-dimensions of the territorial impact, referring to the concept of territorial cohesion. Our proposal – concerning the sub-dimensions of: Territorial Efficiency, Territorial Quality and Territorial Identity – was already discussed and agreed with the ESPON CU in July '08.

The general concept has also been fully shared by the research partners during the month of September '08 and a detailed overview of the research approach and phases produced.
State of the art and literature analysis on the single main tasks of the research project, namely:

- Existing territorial impact reflections, approaches and models (LP),
- Multicriteria methods which could be useful for a territorial assessment (P3),
- Existing recent exercises in impact assessment of CAP and Transport policies (P2 and S1LP),

are presented in this Report.

[14] The general structure of the TEQUILA Model was recently presented to the 48th Congress of the European Regional Science Association (ERSA 2008, Liverpool 27-31 August 2008).

Third task: general evaluation of data sources and difficulties. We remind here that the research project has a mainly methodological character and will be based on existing information at EUROSTAT and ESPON data base. Changes in the definition of NUTS2 and 3 regions may cause problems, that will not be tackled by the project.

WP 2.2. Data collection.

Partners involved: LP, P2 and S1LP
Period: 2 months
End: Nov '08

Data potentially useful for the research work under the tree classes of:

- impacts
- vulnerability and receptivity to impacts
- desirability of impacts (territorial value functions)

will be collected and their condition inspected.

Partners involved and tasks:

- LP (vulnerability and desirability indicators),
- P2 (agricultural structure and performance in regions) and
- S1LP (transport infrastructure and flows, trip origins and destinations).

WP 2.3. Multi-criteria methodology

Partners involved: P3 and LP
Period: 3 months
End: Dec '08

Partner 3 will be in charge of suggesting improvements and complexification of the simple Multi Criteria structure of the existing TEQUILA model, in terms of :

- definition of weights, standardisation and variability of the impact variables;
- treatment of qualitative impact judgements inside the general methodology,
- territorial value functions.

These improvements will be discussed and elaborated with the LP, and subsequently transferred to the other partners, which will on their turn suggest corrections and improvements, starting from their specific field expertise.

A format for the experts meetings (WP2.5) – in terms of structure, professionalities involved, questions and elaborations of answers - will also be provided.

Results of this WP will be assumed as necessary methodological frames for the Impact Assessment phase, both in its Single Dimension Impacts of the two policies (WP2.4 and 2.6) and in the Summative Impacts (WP2.7). The methodological improvements will structure the TEQUILA 2 model.

Utilising data provided in WP2.2, the vulnerability indicators and desirability indicators will be proposed, to be assessed during the expert meetings (WP2.5) as far as their variability and normalisation is concerned.

WP 2.4. Impact assessment methodology in the two case studies.

Partners involved: P2 and S1LP
Period: 3 months
End: Dec '08

Methodology for impact assessment requires a particular attention as far as CAP policy is concerned (P2). Scarcity of previous research works, spatial aggregation of data, qualitative nature of many expected impacts, necessity to figure out with an imaginative effort the dimensions/criteria on which impact could be assessed: all these elements imply a crucial role for the methodological part of the research work.

The situation of the transport policy case is different: here exercises and models for assessing impacts on some regional dimensions (GDP, accessibility, emissions) are available; they have to be calibrated and applied to new policy scenarios with respect to the past. Furthermore, other typologies of impacts will be inspected, and will require new methodologies for calibration and simulation/forecast.

Procedures experimented with the TEQUILA model could represent the first step. A clear definition of the dimensions (and consequently the indicators) to be taken into consideration in the applicative part (WP2.6) is expected.

The two teams will also be involved in inspecting interregional spill-over effects of policies: channels, intensity, methods for estimation/calibration.

WP 2.5. Experts meetings for defining value functions: all teams involved, before and after empirical assessments.

All partners involved
Period: 1+1 months
End: Jan '09 and Mai '09.

On the basis of indications emerging from WP2.3, all teams will host an expert meeting in order to define the appropriate value functions, to be exploited both in single-dimension impacts and in summative impacts.

Expert meetings at the location of P2 and S1LP will inspect potential values of impacts in the two policy cases. Those organised at the location of LP and P3 will reflect on the general structure of the MC model and the construction of territorial value functions. These meetings will take place in December 2008.

Probably, a second round of experts meeting will be necessary at the end of the empirical assessment phase (WP2.6).

WP 2.6. Single-dimension impact assessment.

Partners involved: P2 and S1LP
Period: 3 months
End: Apr '09

This will be the empirical assessment phase, realised through quantitative modelling or qualitative judgements. The two teams will work in parallel, under the supervision of the LP. Data and methods will be available form previous WPs.

The output will be a series of files with the quantitative impact estimated on each dimension/criterion defined in the methodology (WP2.4). The nature of these impacts is defined as "potential impacts" in our methodology: it requires subsequently a "territorialisation" with the use of the vulnerability and the desirability indicators developed by the LP in WP2.3., validated by the experts in WP2.5.

WP 2.7. Summative impact assessment: software package and application.

Partner involved LP
Period 2+2 months
End: Mar '09 and Jun '09.

The summative assessment of impacts has to deal with the comparability and compensation among impacts on single dimensions/criteria, following the methodological and operational decisions taken in WP2.3 and WP2.5.

The main tasks will be:

- preparation of a software package for the entire TEQUILA 2 model (WP2.7.1), hosting all SDI as parts of the SI – Summative Impact model. Ways of introducing "flags" on single regional impacts that will not be compensated by other scores in other impacts will be provided. This task will be mainly carried out by Subcontractor 2 of LP;
- implementation of the operational model and package with the files on single dimension impacts coming from WP2.6, "territorialized" as explained in the previous point. Tests and assessment of robustness of results will be provided, together with sensitivity analysis to changes in model parameters. This task will be realised by the LP (WP2.7.2).

WP 2.8. Drafting of Final Report.

All partners involved
Period 1+3 months
End: Jul '09 and Oct '09.

The full operationalisation of the TEQUILA 2 model realised in the previous WP represents the main content of the Draft Final Report due in June 2009.

It will be accompanied by:
i. a compact description of the characteristics of the new model, including methodologies for SDI assessment and SI assessment; presentation and description of the "summative" Territorial Impact Assessment philosophy and procedure;

ii. presentation and description of SDI impacts, respectively on
- Regional situation (economic, social, environmental),
- Regional competitiveness (Lisbon strategy),
- Climate change (Kyoto strategy).

iii. presentation of the results of Territorial Impact Assessment, including regional wornings and "flags";

iv. Policy recommendations concerning possible policy alternatives;

v. ways forward, concerning possible improvements in the methodology, in the data required, in the definition of content of policies, and suggestions for enlargements to other useful fields of inquiry (social policies, sectoral policies).

5.3 The dissemination of the results

Given the methodological and innovative character of the entire research project, presentation and discussion of the models and the empirical results will constitute the subject of papers delivered in scientific meetings. For sure, the methodological part will be presented at the Annual Conference of the European Regional Science Association, which will be held at the end of August 2009; empirical results and achievements cold also be presented at the subsequent Conference in 2010.

Other scientific occasions will be the Conferences of AESOP (the association of European schools of planning, deeply interested in European territorial cohesion policies), the meetings of the European Council of Spatial Planners and the biennial Conference of the European Evaluation Society. Specialist partners (P2 and S1LP) will present results at the European conferences of transport and agricultural policies.

Scientific papers will be presented for consideration in international journals in Regional Science, planning, geography, transportation and agricultural research. At the end, the possibility of producing a full book with an international publishing company will be considered (costs not included in the budget, but in general are not prohibitive if the publishing company trusts the work).

A scientific workshop will be organised in cooperation with ESPON, either inside one of its scientific meetings or outside.

Beyond that, presentation of results at DG REGIO will be organised, and subsequently at DG TRAN and DG AGRICULTURE (if possible and if requested), with possibility of interactive change of some of the model parameters (weights, etc.).

Costs for travels for participation in these meetings will be held by the partners of the project.

Single partners could also make presentations of results at some national meeting, still with a comparative goal (results are particularly relevant in an interregional comparative setting), and publish in national journals.

Presentation and discussion of results in some regional cases where the FLAG methodology suggests a state of alert and limited possibility of trading/compensating among different impact dimensions will also be a possibility; interactive games will also be carried out, through changes in the value functions.

In these last cases, cost is not included in the budget, but participation and dissemination will be welcome.

5.4 The requested deliveries

5.4.1 The ESPON meeting (December 2008)

In December 2008, the TIPTAP project partners will attend the ESPON meeting to present the main aspects of the methodology developed in the research. This occasion will be useful for a direct contact with ESPON CU, DGs and others stakeholders in order to:

- improve the general methodology and share first results,
- verify specifically the characteristics of transparency of the methodology in order to use the TIA in policy design processes.

Thanks to the interactions inside this meeting, we will collect useful indications to make the TEQUILA Model more 'user friendly' and prepare the Interim Report. The possibility of circulating a questionnaire among attendants concerning crucial elements like the weights of the different criteria and the definition of a territorial utility function will be explored.

5.4.2 The Interim Report (March 2009)

As required by the ESPON CU, the "Interim Report shall reflect the orientations expressed in the Inception Report", improved by the research work and the discussions with the Sounding Board.

Referring to the ESPON requirements, the main contents of the Interim Report will include

- definition of the general and applicative methodology, with main attention to theoretical basis, territorial goals assessed and cause-effect/impact aspects,
- Overview of the data and main indicators which will be used,
- First hypotheses to test the TIA Model through the definition of territorial 'value function',

The Interim Report will include also preliminary results and first policy implications. Furthermore, the Interim Report will include also the Table of Contents of the Final Report.

5.4.3 The Final Report (Draft Final Report: July 2009; Final Report: October 2009)

As required by ESPON, the Final Report is conceived in two steps:

- a first draft (July 2009)

- and the final version (October 2009).

These two-steps will be useful to take into account the feedbacks of the Sounding Board and other comments received.

The Draft and the Final Report will include

- A Report (max. 50 pages) with the main results, addressed mainly to policy makers interested in territorial competitiveness and cohesion. The main contents will be focused on the operational application of the TEQUILA Model, on main results of policy impact assessment, and on some policy recommendations.
- An Executive Summary (10 pages) summarising main results.
- A Scientific Report including the entire research activities required by ESPON and developed during the project. Specifically, the Scientific Report will include
    - literature and methodology used,
    - the conceptual framework, referring to indicators and data used,
    - in order to verify the consistency of the model,
    - the results for the TIA applied to the required policies
    - indications for further research and how operationalize the TIA tool.

6 NEW STRUCTURE OF THE BUDGET

The TIPTAP Transnational Project Group needs a marginal adjustment in its budget in order to equilibrate some activities between partners. The change in the budget respects the 'flexibility rule' as defined in the ESPON Programme manual (chapter 8.8, pg. 34-35). The change does not exceed the limit of the 10% or € 20.000 in the same budget line. The following schema resumes the variation required.

	LP PoliMi, DIG (Italy)			
	Approved budget	*New budget*	*Variation*	*%*
Staff	€ 88.000	€ 84.000	- € 4.000	- 5%
Administration	€ 14.000	€ 14.000	---	---
Travel and Accomodation	€ 21.000	€ 21.000	---	---
Equipment	€ -	€ -	---	---
External expertise	€ 104.000	€ 104.000	---	---
TOTAL	€ 227.000	€ 223.000	- € 4.000	- 2%
	P2 Newcastle University (UK)			
	Approved budget	*New budget*	*Variation*	*%*
Staff	€ 60.000	€ 60.000	---	---
Administration	€ 5.500	€ 5.500	---	---
Travel and Accomodation	€ 12.000	€ 12.000	---	---
Equipment	€ -	€ -	---	---
External expertise	€ 2.500	€ 2.500	---	---
TOTAL	€ 80.000	€ 80.000	---	---
	P3 VU University (NL)			
	Approved budget	*New budget*	*Variation*	*%*
Staff	€ 30.000	€ 35.000	+ € 5.000	+ 17%
Administration	€ 4.000	€ 4.000	---	---
Travel and Accomodation	€ 6.000	€ 5.000	- € 1.000	- 17%
Equipment	€ -	€ -	---	---
External expertise	€ -	€ -	---	---
TOTAL	€ 40.000	€ 44.000	€ 4.000	+ 10%

This decision was defined in agreement with all Partners and Subcontractors.
Through this change, the total budget of P3 is increased by the +10% strengthening its involvement in the project, while the total budget architecture does not change significantly.

The total amount of the project budget will not be affected by this variation.

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8 ANNEXES

8.1 Partnership Agreement with University of Newcastle-upon-Tyne (P2)

(See Annex 1)

8.2 Partnership Agreement with VU Free University of Amsterdam (P3)

(See Annex 2)