



COST350
Integrated Assessment of
Environmental Impact of Traffic and
Transport Infrastructure
- A Strategic Approach

Part C
Chapter 1
WG 1 Final Deliverable

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Executive Summary

Introduction

Background

COST350 is involved with the Integrated Assessment of Environmental Impacts of Traffic and Transport Infrastructure as defined in the Technical Annex of February 2001. The Technical Annex defines a number of Work Packages to be executed during the Cost Action. Working Group 1 (WG1) was established to carry out the work in Work Package 1 (WP1) which is involved with defining the contents, process, information needs and pre-conditions for the execution of the Cost Action. The present document describes the final deliverable of Working Group 1 of COST350 as a result of the activities in the period March - October 2002.

Activities of working group 1

Delegates from 10 countries took part in the activities of WG1 (France, UK, Germany, Spain, Greece, Hungary, Belgium, Italy, Austria and the Netherlands). The working group was chaired by the Netherlands. The results of WG1 were based on three meetings held in 2002, as follows:

- Delft, The Netherlands on 8 March
- Madrid, Spain on 6 and 7 June
- Brussels, Belgium on 6 September

Status and present result

The final deliverable of WG1 elaborates the scope and the overall framework for the execution of the Cost Action and defines the key elements of the methodological approach. In particular, the present document identifies and specifies the work packages to be executed in the next three years, setting the frame for the work plan of the Cost Action.

Scope of COST350 Action

The scope of COST350 was defined in terms of the following aspects:

- Target groups to be considered are the decision makers involved with the planning of transport infrastructure. The Ministry of Transport was defined as the most important target group.
- The focus of COST350 will be to develop an operational methodology in support of Strategic Environmental Assessment (SEA).
- The final deliverable should be methodological hints for the actual application of key aspects of SEA in decision-making on transport infrastructure.
- Impacts and indicators will be considered within an overall framework including environmental, economic and social aspects. Actual methodological development within Cost 350 will merely focus on the environmental impacts of traffic and transport infrastructure.
- Impacts and indicators to be defined should be primarily based on the requirements of relevant decision makers. Links are to be established between impact assessment methods applied at various stages of the decision-making process such as SEA and EIA (Environmental Impact Assessment).
- Explicit attention will be given to the aggregation of indicators for decision-making purposes, distinguishing between scientifically based, 'objective' aggregation and 'subjective' aggregation based on perception of impacts by the population or on political positions.

- Country case studies are to play an important role in COST350, serving as a vehicle for methodological development, and ensuring the accommodation of actual country needs.

COST350 framework

Main elements of framework

The COST350 framework specifies the methodological approach as a logical structure of steps and definitions. Main elements include:

- Transport infrastructure planning situations and planning options.
- Impact and indicator structure.
- Impact assessment and impact aggregation methods.
- Transport planning option parameters and assessment methods.

Framework design philosophy

The development of the framework is based on the following design principles:

- **Completeness:** consider environmental impacts within an overall overview of impacts relevant for transport infrastructure planning.
- **Flexibility:** allow for adjustments during methodological development without changing basic approach.
- **Pragmatism:** provide a starting point for impact assessment based on existing knowledge and available information and allow for further developments in scientific knowledge and information to improve the potential of the framework.
- **Consistency:** ensure and facilitate the streamlining of assessment methods on various levels of the decision-making process (such as SEA and EIA).

Transport infrastructure planning situations

SEA generally applies to the strategic planning levels prior to the project level, in particular the level of plans and programs. Within the possible SEA applications, a variety of physical schematisations levels may be considered. These could in principle range from transport networks on international or national scale to local corridors. Decisions on actual planning situations to be considered in COST350 will be based on an inventory and evaluation of relevant transport infrastructure planning problems in participating countries (country case studies) which are *potentially* subject to SEA.

Transport infrastructure planning options

Planning options pertain to *strategic* decisions about the possible modification or expansion of transport infrastructure, such as options for the construction or expansion of network links of the various transportation modes and the enhancement of inter-modal transport (transfer facilities at network nodes). Other measures to be considered are to improve efficiency of existing transport capacity (for example by traffic flow management and measures affecting modal split and route choices) and mitigating measures (such as noise and emission abatement).

Impact and indicator structure

The focus of COST350 is on the environmental impacts of global, regional and local adverse effects of transport infrastructure, distinguishing between the natural and human environment. Inventories and further specifications of impacts and indicators are to be considered within a logical structure as provided in the present framework. The further specifications will be based on a converging process, taking into account the requirements of the decision-making processes in the various countries, efforts involved in development of assessment methods, and available analytical resources.

Impact assessment and impact aggregation methods

Impact assessment methods aim to provide quantitative relationships between specified infrastructure planning options and the relevant environmental indicators. Major considerations are involved with the physical/geographical scale of the planning options versus the physical scale of the impact, determining the level of detail of available and required information. Depending on these levels and scales, existing assessment principles may or may not be feasible and new methodologies may have to be further explored and developed.

The aggregation of indicators will be considered in two steps. The first step will be to combine impacts within logical categories that allow for a meaningful scientific interpretation. A next step of aggregation would be based on value judgments by politicians or interest groups.

Transport planning option parameters and assessment methods

The methods to be applied in the environmental impact assessment determine the information requirements related to transport planning options. The relevant parameters to be specified include information on traffic flows, transport networks, and impact zones. Various assessment methods are to be considered and explored to accommodate these information needs, such as transportation models describing traffic flows; technological specifications and projections of fleets and vehicles; transport network inventories and descriptions; and data processing and spatial analysis techniques related to impact zones.

Specification of work packages and work plan

Work packages

Based on the COST350 framework, work packages have been defined as follows:

- WP2: Identification and description of infrastructure planning situations and options.
- WP3: Identification and definition of environmental impacts and indicators and development of impact assessment methods.
- WP4: Specification of transport planning option parameters and development of transport parameter assessment methods.
- WP5: Aggregation of impacts/indicators and development of integration methods.
- WP6: Synthesis of COST350 methodology.

More specific tasks and results to be achieved are specified within each of these work packages.

Relationships between work packages

- All work packages are clearly interrelated and should be closely co-ordinated and re-iterated. Particularly, there are strong interrelationships between WPs 3, 4 and 6.
- Case studies to be identified within the various countries would be the basis for the inventories and specifications in WPs 2 to 5.
- Based on the framework developed in the present document, the inventories and specifications in WP2 will provide guidance and direction to the more specific, discipline-oriented developments in WPs 3-5.
- Further research needs are identified within WPs 3, 4 and 5 and summarised and prioritised in WP6.
- The development of a dissemination and communication plan across the various work packages is foreseen as a separate action, to be assigned to a 'dissemination co-ordinator'.

Staffing of working groups

Working groups will be established which correspond to the above work packages. Chairs have been appointed for Working Groups (WG) 2 through 5 as follows:

WG2: F. Zotter (A)

WG3: G. Arapis (Gr)

WG4: C. Pronello (I)

WG5: P. Tomlinson (UK)

WG6: J. Gerlach (Ger)

Staffing requirements include policy and decision-making, technical and scientific expertise. Policy and decision-making oriented staff would act as intermediates between the policy and decision-making process and technical/scientific experts. Technical staff is involved with the identification, collection and application of *existing* knowledge, data, concepts and tools. Scientific staff is involved with the improvement of the quality of the assessment by identifying, exploring and applying new concepts and methods.

The main focus of working groups 2 and 6 is on the policy and decision-making aspects; their staffing would be country oriented, pursuing a broad representation of participating countries. Working groups 3, 4, and 5 are discipline oriented, requiring a mix of technical and scientific expertise within various disciplines.

Required efforts and available resources

Required efforts follow from further decisions regarding the scope and priorities to be set in the Cost Action according to the framework developed. Efforts to be spent are potentially big and should be limited from the viewpoint of available resources.

A distinction will be made between working group members which actually take part in working group meetings (4 to 6 members per working group), and backup support group members, to be selected on an as needed basis.

Planning

The emphasis of the activities in WP2 will be in the next year. WPs 3 to 5 would be carried out in parallel in the next two years, guided by WP2. WPs 6 would follow up on WP2, integrating the results of WPs 3 to 5. WPs 2 and 6 focus on integration, while WPs 3 to 5 would be involved with more specific, discipline-oriented activities and developments. In this respect, the activities in WPs 2 and 6 could be considered as a continuous, integrative work package.

1 Introduction

The present document describes the final deliverable of Working Group 1 of COST350 as a result of the activities in the period March - October 2002. COST350 is involved with the Integrated Assessment of Environmental Impacts of Traffic and Transport Infrastructure as defined in the Technical Annex of February 2001.

The objective of COST350 is to establish a concept integrating all the environmental aspects of traffic and land-transport infrastructure in relation to the decision-making process, in order to assist policy makers at an earlier stage of their decision-making on transport and mobility.

In the Technical Annex, a number of Work Packages were identified to be executed during the Cost Action. Working Group 1 (WG1) was established to carry out the work in Work Package 1 (WP1), setting the scope for the Cost Action.

According to the specifications in the Technical Annex, WP1 is involved with defining the contents, process, information needs and pre-conditions for the execution of the Cost Action. Relevant concepts such as sustainability and environmental impact should be further defined, and a rough outline should be provided of how to integrate the information into a single concept. Moreover, WP1 is to address the decision-making process and user requirements in the various countries which are essential to achieving a good result in this Action. As such, WP1 is to provide a framework for the activities in the other work packages and for the integration of the results obtained in these work packages.

Delegates from the following 10 countries took part in the activities of WG1: France, UK, Germany, Spain, Greece, Hungary, Belgium, Italy, Austria and the Netherlands. The working group was chaired by the Netherlands. An overview of delegates attending one or more of the meetings of WG1 is provided in Appendix 1.

The present document is based on the results on the following three WG1 meetings held in 2002:

- 1 Delft, The Netherlands on 8 March
- 2 Madrid, Spain on 6 and 7 June
- 3 Brussels, Belgium on 6 September

During the meeting in Delft, discussions were held on "scope", "integration" and "process" of the Cost Action. Based on these discussions the following questions and requirements were identified:

- Outline of relevant decision-making processes by country.
- Definition of main target groups and related user requirements.
- Definition of the final deliverable of the Cost Action.
- Contribution of Cost Action to the implementation the SEA (Strategic Environmental Assessment) directive.
- Outline of possible integration of information into one concept.
- Description of the concept sustainability and environmental impact in the Cost Action.
- State of the art of methods and tools by country.
- Rough outline of framework for contents of other Work Packages.
- List of relevant information and data known and required.

Following the Delft meeting, each participating country was assigned the task to elaborate the above questions and requirements. Moreover, each participating country was requested to prepare its own set of terms and definitions according to a pre-defined list which was compiled at the Delft meeting.

During the Madrid workshop, country presentations were held on the contributions prepared by the participating delegates. Following these presentations, further discussions were held on some of the key issues defining the scope of the project, including: (1) the final deliverables and positioning of the Cost Action (in particular in relation to SEA); and (2) impacts, indicators and integration issues. Based on the results of the workshop, the following main tasks were identified and assigned:

- to draft a proposal for the re-organisation and re-definition of work packages;
- to draft a proposal for an updated and completed formulation of terms and definitions;
- to draft a proposal for the formulation of the overall framework;
- to identify and describe relevant country case studies.

At the Brussels meeting, the results of the above tasks, as well as the intermediate comments provided by participants, were extensively discussed and further conclusions were made about the contents of the final deliverable and the further activities required.

The present document reflects the results of the activities and discussions of the three WG1 meetings.

Chapter 2 provides a description of the scope of the COST350 Action in terms of objectives and positioning, deliverables to be developed, and main principles of methodological approach.

Chapter 3 describes the overall framework for the further development of the Cost Action. Following a specification of the framework design philosophy, this chapter elaborates the key elements of methodological approach including: the identification of relevant transport infrastructure planning options; the environmental impact/indicator structure and related assessment methods; and the specification of transport planning option parameters required for the assessment.

Chapter 4 is involved with the identification and further specification of the work packages to be considered, setting the frame for the work plan of the Cost Action.

Appendices to this document include the following.

Appendix 1 presents an overview of participating delegates and countries in the WG1 meetings held in 2002.

Appendix 2 contains an overview of consolidated terms and definitions underlying the development of the COST350 methodology.

Appendix 3 includes an overview of projects and expert networks in the European context which could be relevant for the Cost Action as potential information sources or as platforms for exchanging and disseminating knowledge, methodological concepts and results.

In addition to the contents of this final deliverable, a number of other useful results were produced during the activities of WG1. These include:

- Extensive minutes of the WG1 meetings describing the development process and the results of discussions.
- A compilation of country contributions in terms of the questions and requirements defined at the Delft meeting and discussed at the Madrid workshop.

- A (preliminary) overview and description of candidate country case studies as compiled by the members of WG1. These candidate case studies will be used for the identification and specification of relevant country situations to be accommodated by the Cost Action and are considered a very important basis for the development and application of the COST350 methodology. In this respect, the present overview of case studies is merely to be considered as a starting point, which should be further extended and processed in the next steps of the Cost Action.
- Various intermediate working documents and presentations prepared for the WG1 meetings and used as building blocks for the present final deliverable.

These results have all been made available on the COST350 website.

2 Scope of COST350 Action

The scope of the COST350 Action was extensively discussed during the last three meetings of WG1 (in Delft, Madrid and Brussels, respectively). During these discussions, a consensus was achieved on a number of important issues regarding the further specification of the COST350 Action. This has resulted in the identification of a number of "common grounds" related to the following aspects:

- 1) target groups to be considered;
- 2) relation of COST350 with strategic environmental assessment (SEA);
- 3) deliverables of COST350;
- 4) impacts and indicators to be considered;
- 5) nature and level of impacts assessment;
- 6) aggregation of indicators;
- 7) role of case studies.

1) Target groups to be considered

There is a general agreement that the methodology to be developed in COST350 should be supportive of the decision-making process. Therefore, the general target group are the decision makers involved with the planning of transport infrastructure. The Ministry of Transport is considered the most important decision maker. Other relevant decision makers are the Ministry of Environment and regional authorities (at the level of provinces, districts or municipalities).

2) Relation of COST350 with SEA

There is a large degree of consensus that the COST350 Action should focus on SEA. The aim of COST350 would be to provide hints for key aspects helping to carry out a strategic assessment for relevant planning situations for which SEA is required. This means that, starting from the SEA directive, it should be made clear how the environmental impacts are to be defined and assessed, in addition to other relevant (economic and social) impacts. Particularly, the COST350 Action should take into account the specific situations and processes in different country settings, at the relevant levels of strategic assessment (i.e. the national, regional and local level).

The application of SEA in transport infrastructure planning may potentially cover a wide range of levels and scales, depending on the planning situations in the various countries. During the discussions at the various meetings it turned out that the interpretation and application of the SEA Directive in most countries is not yet very clear. Also there seem to exist important differences in the interpretation of the various countries. Consequently, the present status and interpretation of SEA does not yet provide a solid basis to clearly identify the relevant planning situations to be considered. It was therefore decided that at this stage the *actual* SEA status should not be decisive in selecting the relevant planning situations. Rather, a range of suitable strategic transport infrastructure planning problems should be identified according to the directions provided in the Technical Annex, which would *potentially* be subject to SEA.

3) Deliverables of COST350

The final deliverable should be a report with key aspects which are focused on the actual application of SEA in decision-making on transport infrastructure. The final report should first of all provide an inventory of planning situations which are considered most relevant from the point of view of SEA application. For these planning situations, the report should elaborate the main problems and planning issues; the impacts and indicators to be considered; the specification of assessment and evaluation methods; and the required and available data and instruments (tools). The development of the COST350 approach should be based on country related inventories and critical analyses of the above elements. Country-specific case studies are considered an important basis for developing, testing and illustrating the proposed approach.

4) Impacts and indicators to be considered

Within the COST350 Action, the starting point is to consider the evaluation of transport infrastructure options from the viewpoint of sustainable development. This requires the explicit consideration of environmental, economic and social aspects in a single framework. Within the development of this framework the focus is on the environmental impacts of traffic and transport infrastructure, distinguishing between global environmental impacts (for example related to climate change and use of resources); impacts related to the natural environment (such as air, water and soil pollution and impacts on fauna and flora); and impacts on the human environment (such as health effects, noise nuisance and safety).

Indicators describe the condition of the system to be evaluated. They are the 'measuring rods' to quantify the impacts. At least one indicator should be defined for each relevant impact, which ideally would directly reflect the extent of the impact it represents. In support of the decision-making process, indicators may also be used in more specific ways, for example to define targets, limits or standards. Within the Cost Action, various types of use of indicators may have to be considered, depending on specific requirements following from the decision-making process.

During the discussions at the workshops it was concluded that there is quite a variety in existing definitions and specifications of the more detailed types of impacts and indicators. Therefore, the identification and evaluation of existing typologies, definitions and assessment methods should constitute a major part of the Cost Action in the next few years, requiring the input of technical and scientific expertise within various disciplines.

5) Nature and level of impacts assessment

It was agreed that the first logical step within the development of the approach would be to identify the relevant (environmental) impacts of transport infrastructure. Since the key aspects of SEA to be developed in COST350 aims to support the decision-making process, the impact and indicator structure to be developed should firstly meet the requirements of the relevant decision makers. Consequently, the development of the desired impact and indicator system will be based on a technical, policy oriented approach. Within these requirements, the aim is to provide scientifically sound information. Hence in the actual development of the indicator structure and the related assessment methods, the best available scientific knowledge and information has to be

mobilised and be expanded where possible, within the practical boundary conditions of the Cost Action.

The desired impact and indicator system and the required assessment methods in turn dictate the information needs related to the transport infrastructure planning options considered (in terms of transport networks, traffic flows and characteristics of zones affected by traffic and transport infrastructure). These information needs then define the requirements to be fulfilled by experts on transport planning and traffic flows.

An important question to be addressed is the relationship between the SEA methodology to be developed and the existing EIA practices. In this respect it was agreed that a firm link should be maintained between the impacts and assessment methods considered within SEA and EIA, in order to maintain the consistency of the assessment. This could in fact mean that for certain impacts and indicators the same types of assessment would be made in both SEA and EIA, merely involving different geographical scales and different levels of detail. For other impacts and indicators the implication could be that in COST350 different definitions and assessment methods need to be developed, since EIA-level approaches would not be feasible at the higher abstraction levels which would be typical for SEA.

6) Aggregation of indicators

Considering the various types and scales of impacts there are limitations to the maximum level of 'objective' aggregation that can be achieved, where objective is tentatively defined as a way of aggregation that could still be founded in the existing knowledge of scientific communities. A further aggregation would have to be based on the perception of impacts by the population or on political positions, requiring subjective value judgments. The COST350 Action would focus on the identification of the maximum level of objective aggregation. In addition, the Cost Action should support the further development and application of methods for subjective evaluation to be applied by responsible decision makers, for example based on multi criteria analysis.

7) Role of case studies

During the discussions at the various meetings it was concluded that the inventory and selection of actual case studies on strategic transport infrastructure planning problems would provide an important vehicle for the development of the approach to be pursued in the Cost Action. Given a range of concrete cases, the emphasis of COST350 would be directed to the range of planning problems that is common to all or most participating countries. This is particularly important in view of the present differences and unclarities in the interpretation of the scope of SEA.

It is therefore concluded that the inventory and interpretation of case studies as a basis for defining specific country situations and country needs is a high priority activity in the continuation of the COST350 activities in the next year.

3 Development of the COST350 framework

Following from the scope of the COST350 Action as defined in chapter 2 of this document, the main aspects to be addressed in the framework are:

- The identification and description of transport infrastructure planning situations and planning options to be considered.
- The identification and definition of the impacts and indicators to be considered and the development of impact assessment methods.
- The specification of transport planning option information requirements and the development of transport parameter assessment methods.

Figure 1 provides an overview of the development process of the COST350 framework, reflecting the logical order of activities. The process is driven by the information needs of decision makers following from the identification of relevant transport infrastructure planning situations and options. These information needs define the required impact and indicator structure and the subsequent requirements for the development of environmental impact assessment methods. Additional information requirements in terms of transport planning option parameters and related assessment methods then logically follow from the identification of relevant planning situations and the specification of the environmental impact assessment.

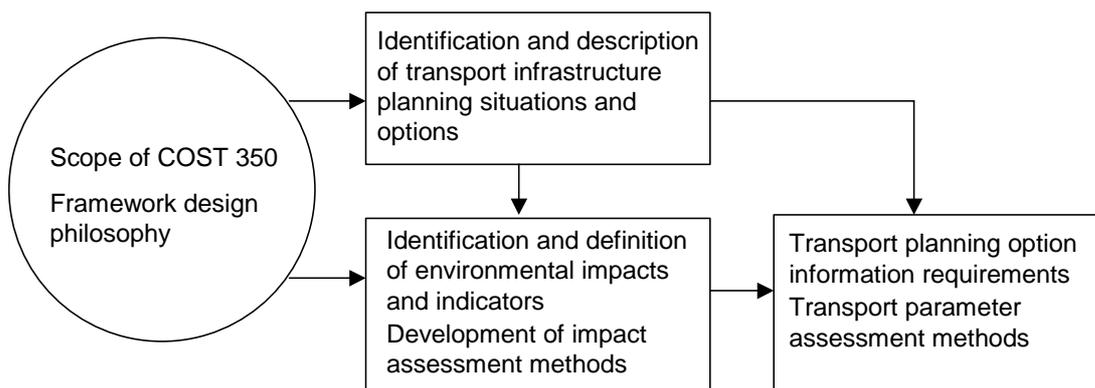


Figure 1 Development process of COST350 framework

The present chapter describes the development of the framework. It first addresses the framework design philosophy in terms of the main development principles. Following sections elaborate specific elements of the framework, including:

- Transport infrastructure planning situations and planning options.
- Impact and indicator structure.
- Impact assessment and impact aggregation methods.
- Transport planning option parameters and assessment methods.

3.1 Framework design philosophy

The framework describes the methodological approach to the impact assessment of transport infrastructure planning options as a logical structure of steps and definitions. The planning options to be considered should be in agreement with the scope of Strategic Environmental Assessment (SEA). The impact assessment focuses on environmental impacts, but should identify other impacts which are relevant for the decision-making process.

Main aspects to be further addressed during the execution of the COST350 Action include:

- the planning situations and geographical scales (potentially subject to SEA) for which the framework should be actually developed and applied;
- the numbers, types and operational definitions of impacts and indicators to be considered;
- the level of detail (scientific depth) to be considered in impact assessment;
- the extent to which impacts/indicators can/should be aggregated and the aggregation principles to be used.

The framework should facilitate the discussion on the above and other relevant aspects and issues that may emerge during the further methodological development. Depending on the outcomes of these discussions, the framework should anticipate a range of different possibilities and different levels of detail that might be desired in the further elaboration of the COST350 approach. This is reflected in a number of framework design principles, as follows:

- **Completeness:** the framework will consider a complete overview (or rather: as complete as reasonably possible) of relevant impacts related to decision-making in transport infrastructure planning. This requirement follows from the principle agreement that the framework should provide a more or less complete 'umbrella' or checklist of relevant effects which was the consensus achieved during the various discussions. Starting from this overview, the methodological developments to be considered in COST350 will focus on the environmental impacts.
- **Flexibility:** the framework should be set-up in such a way that choices and adjustments could be made during the further development of the COST350 report without changing the basic approach.
- **Pragmatism:** the framework should provide a starting point for impact assessment based on existing knowledge and available information. Further development in scientific knowledge and available information would improve the potential of the framework, but should not be a necessity for its short term use. Experiences from short term applications of the framework would provide further guidance to the identification and prioritisation of additional knowledge and data requirements.
- **Consistency:** methods to be developed for impact assessment in SEA should be in agreement with the nature and scale of the impact and the availability of actual data. Where relevant and possible, definitions and assessment methods to be developed should be consistent with methods applied at other levels of (environmental) impact assessment such as EIA, in order to facilitate the streamlining of the assessment procedure across the various levels.

The framework was set up and should be further developed to meet the above requirements, providing a basis for making further choices and selections during the execution of the Cost Action.

3.2 Transport infrastructure planning situations and planning options

3.2.1 Transport infrastructure planning situations

SEA generally applies to the strategic planning levels prior to the project level, in particular the level of plans and programs. The strategic planning level could apply to various physical or administrative scales, including the (inter)national, regional and local level. The need for application of SEA in transport infrastructure planning generally pertains to plans which have significant adverse environmental effects.

In order for SEA to apply there is the condition that the plan or program to be assessed should have a legal basis (i.e. be required by law). This usually applies for plans and programs setting a framework for projects requiring EIA (where projects subject to EIA are quite clearly defined). If no SEA is carried out, the initiator of the planning process should demonstrate there are no significant environmental effects.

From the discussions aimed at defining the scope of the Cost Action it was concluded that the present status and interpretation of SEA in the various countries does not yet provide a solid basis to clearly identify the relevant planning situations to be considered for SEA. In the Cost Action, the identification of relevant planning situations will therefore be based on actual transport infrastructure planning problems within the participating countries which are *potentially* subject to SEA.

The manual on SEA of Transport Infrastructure Plans (European Commission, DGVII Transport, February 1999) defines two levels of SEA application, i.e. the network and the corridor level. The network level covers the overall Trans European Transport Network as well as national and regional network schemes. The corridor level would be involved with more detailed assessments, where a corridor is defined as the area between two urban centres or other centres of activities generating transport demands. Both on network and corridor level, transport planning options should be considered from a multi-modal perspective. It should be noted that there is no strict separation between a network and corridor level. Essentially they both represent more or less extended parts of infrastructure networks.

Within the possible SEA applications, a variety of physical schematisations levels may be considered. These could in principle range from transport networks on international or national scale to local corridors. Figure 2 illustrates the various geographical planning levels and scales that might be considered in the Cost Action.

In addition to the delineation of the physical schematisation level, as indicated in figure 2, there is a need to define a *macro-environment* (which is not necessarily area-specific) as a basis for the assessment of relevant future developments applying to the transportation system. Such developments would pertain to, for example, economic growth, transportation demand (mobility), transportation technology aspects, etc., to be specified in one or more scenarios.

With respect to the further specification of the relevant planning situations, a number of observations and suggestions were raised during the WG1 meetings, as follows:

- The separation between a corridor and network level is considered rather artificial, since a corridor is essentially also a part of a network.

- There is no immediate reason why a strategic approach on the level of, for example a metropolitan area, should be fundamentally different from an approach on national level.
- Relevant scales are basically to be determined by the relevant decision-making processes that the Cost Action focuses on.
- Within the strategic level, due attention should be given to the time scale of the decision-making (focusing on the longer term).
- When addressing physical scales it could be useful to think in terms of ecological or physical entities such as valleys, forests, watersheds, urban systems, etc.
- Due to different geographical scales of countries it is generally useless to speak in terms of national, regional, local; rather the scales to be considered should be expressed in terms of km and km².
- It would be relevant to distinguish between the geographical scale of the project (planning area) and the scale of the impact.

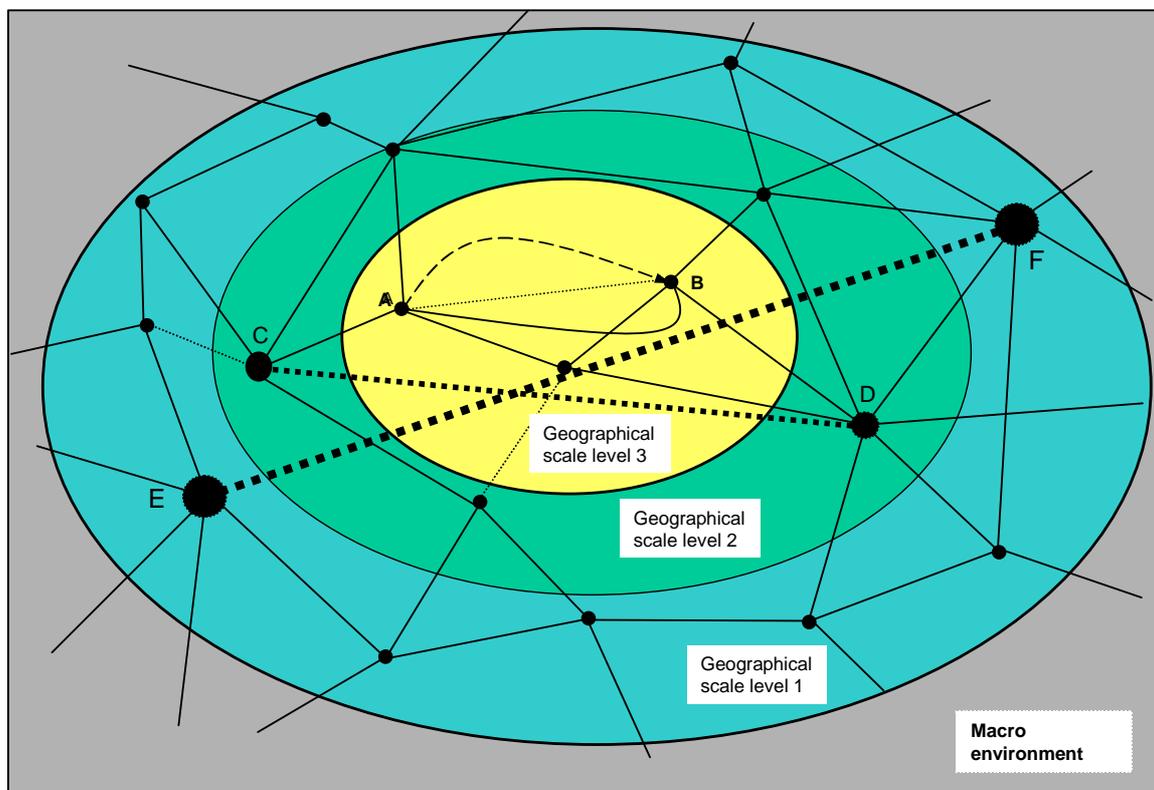


Figure 2 Potential COST350 planning levels

In the next steps of execution of the Cost Action, further decisions are to be made about the planning levels and scales to be actually facilitated in the methodological development. These decisions will be based on an inventory and evaluation of relevant transport infrastructure planning problems in the participating countries (country case studies). Following the Madrid workshop in June, this action was already started by WG1 and is to be continued as a high priority activity in the continuation of the Cost Action.

3.2.2 Transport infrastructure planning options

Planning options to be considered are closely related to the various planning situations. A major requirement is that the options should pertain to *strategic* decisions about the possible modification or expansion of transport infrastructure, including the option to refrain from (further) structural measures.

Structural measures to be considered would typically include options for the construction or expansion of network links of the various transportation modes and the enhancement of inter-modal transport (transfer facilities at network nodes). More specific route alternatives for the various transportation modes and possibilities for conjunctive use of transport modes would be considered within these options.

In addition to these structural measures, other possible measures to be applied would include:

- Measures to improve efficiency of existing transport capacity, such as: logistic measures to improve load factors and occupancy rates; traffic flow management measures; and measures to change choices in routes, modal split and time of day (for example by pricing and regulation).
- Mitigating measures such as regulation measures to enhance traffic safety and noise and emission abatement measures.

The transport infrastructure planning options to be considered would generally be composed from logical combinations of the above types of measures.

Besides the measures to be explicitly considered as part of the planning options, there are a number of possible 'external' developments which may affect the results of the impact assessment. These include, for example:

- Developments in land use and related transport demand generating activities.
- Mobility development by transport motive.
- Improvement of transport (vehicle) technology.

Such developments would typically follow from the results of measures and decisions taken in other sectors of society (by other authorities or private parties) or by multi-national decision makers (for example in relation to vehicle technology). It should be noted that such developments and decisions are actually not to be regarded as 'external' in a strict sense. Transport planning options are not so much the result of external developments, but rather an important trigger to developments related to land use, economic activity and mobility. In this respect, transport planning and related developments should be considered as a dynamic, continuous and interactive process. However, many of these developments are usually not within the direct jurisdiction of transport planners and decision makers. Therefore, such developments are best to be included within explicit scenario specifications related to the macro-environment of the planning area. The dynamic and interactive aspects could then be taken into account by considering a logical range of possible developments within an overall social, economic and technical development context, to be specified in different scenarios.

The strategic environmental impact assessment should be carried out for all transport infrastructure planning options, and within each of the scenario specifications considered.

3.3 Impact and indicator structure

Impacts relate to all relevant, positive or negative, intended and unintended effects brought about by transport infrastructure planning options. Indicators are used to express these effects in quantitative terms. In particular, the indicators could serve as the measuring rods to determine whether desired objectives are achieved by the plans or programs considered.

Possible impacts to be considered in the Cost Action have been extensively discussed in WG1. Table 1 provides an overview of the more general effects, referred to as 'source effects' (listed on the vertical axis) of transport infrastructure in relation to the more specific impacts to be potentially considered (shown on the horizontal axis). For this purpose, the source effects of transport infrastructure have been distinguished within a number of 'effect groups' as follows:

- Global adverse effects: these are the adverse effects which are basically non-area specific (such as climate change and resource use).
- Regional/local adverse effects: adverse effects which are area or location specific (such as pollution, noise, safety and spatial effects).
- Other direct effects: these include the immediate effects of the improvement or expansion of transport infrastructure in terms of enhanced accessibility and mobility (such as time and cost savings).
- Indirect effects: the indirect, positive and negative impacts following from transport infrastructure availability and capacity such as: improvement of development potential; employment opportunity; but also depreciation of property values.
- Distributional effects: effects related to the distribution of positive and negative impacts across the population of different impact areas, or across various groups and layers of society.

More specific impacts are considered within the following main categories:

- Environmental impacts, distinguishing between impacts related to the natural and the human environment.
- Social impacts.
- Economic impacts.

Table 1 indicates the potentially relevant impacts within source effects, effect groups and impact categories. The intention of the overview in this table is to provide a starting point for the further selection and definition of the impacts and indicators to be actually considered in the Cost Action.

Transport infrastructure contributes to a number of different global adverse effects, as one of many possible other sources and activities. Such effects become manifest within all impact categories considered. The Cost Action should address the relative contribution of transport infrastructure planning options to these global impacts. However, in view of the nature and scale of these global impacts, their specific assessment in terms of the various impact categories is beyond the scope of the Cost Action.

Relevant environmental impacts (both related to the natural and human environment) follow from a variety of regional and local adverse effects of traffic and transport infrastructure. Most of these adverse effects also lead to adverse economic impacts.

Additional economic and social impacts are related to other direct effects and indirect effects of transport infrastructure. Distributional effects are merely regarded from a social perspective.

Following the priorities set for COST350, the focus of the assessment will be on the environmental impacts included in the bold frame of table 1. Other relevant impacts will be part of the overall inventory, but are not envisaged to be part of the methodological development in the Cost Action.

Table 1 Overview of potentially relevant impacts

Effects of transport infrastructure	Environmental impacts		Social impacts	Economic impacts
	Related to natural environment	Related to human environment		
Global adverse effects				
Climate change	(x)	(x)	(x)	(x)
Ozone depletion				
Non-renewable energy consumption				
Use of material resources				
Regional/local adverse effects				
Air pollution	x	x		x
Water pollution	x	x		x
Soil pollution	x	x		x
Waste production	x	x		x
Noise nuisance/vibration	x	x		x
Traffic accidents	x	x		x
Barrier effects / land fragment.	x	x		x
Land uptake	x			x
Soil erosion	x			x
Hydrologic/hydraulic risks	x	x		x
Landscape, visual effects, aesthetics, cultural heritage		x		x
Other direct effects			x	x
Indirect effects			x	x
Distributional effects			x	

The identification and specification of specific impacts and indicators to be actually considered in the Cost Action should be based on a converging process taking into account: the requirements following from the decision-making processes in the various countries; the efforts involved in the development of assessment methods; and the resources available within the Cost Action. In particular, this requires an elaboration of the more specific impacts of the 'source effects' as considered in the vertical axis of table 1 related to the natural and human environment (the horizontal axis of table 1), for example in terms of:

- Natural environment: flora and fauna; biodiversity; ecosystems and habitats; etc.
- Human environment: human health; quality of living; safety aspects; etc.

It is noted that, based on existing methodologies and specific country experiences, there may be many existing methods and approaches with respect to the specification of impacts/indicators and related assessment methods. Within the execution of the Cost Action, due attention should be given to the inventory of such methods and approaches in order to identify the most appropriate possibilities for further development and application.

In the execution of this task, the following important considerations apply:

- The scale of the impact in relation to the level and scale of the planning situation considered. The scale of the impact is particularly important in relation to the level of detail of the planning option related information, required for impact assessment.
- The aspect of possible double counting. From table 1 it appears that a particular type of effect may lead to various types of specific impacts within different impact categories. For example: effects in terms of air, water and soil pollution may lead to adverse effects on the natural environment (flora/fauna, habitats); on the human environment (human health, quality of living environment); but also to economic impacts (such as damages to crops, buildings, tourism). Similar observations can be made for the other types of effects. Clear definitions of the various impacts to be quantified are required in order to avoid the risk of double counting.
- The level of sophistication of indicators and assessment methods. The notion is that for the various types of impacts there may in fact be a number of possible assessments, covering a range from relatively simple expressions to more sophisticated and elaborate quantification methods. The starting position for the development of the COST350 methodology should be a first order approach providing a direct and relatively straightforward assessment of the impact in terms of basic quantities believed to provide a reasonable representation of the impact. Based on priorities to be set during the further development process, and the available resources, knowledge and expertise, it should be decided which indicators and assessment methods are to be further elaborated.

3.4 Impact assessment and impact aggregation methods

3.4.1 Impact assessment methods

The methods for impact assessment to be developed in the Cost Action aim to provide quantitative relationships between the nature and extent of the relevant transport infrastructure planning options (section 3.2) and the impacts/indicators deemed essential in the evaluation of planning options (section 3.3).

Major considerations in the development of these assessment methods are:

- the physical/geographical scale and nature of the planning options to be considered;
- the physical scale of the impact.

The scale and nature of the planning options considered determine the extent and level of detail of the information available for impact assessment. The physical scale of the impact determines the information requirements to carry out a 'meaningful' assessment. Obviously, the important question then is: what is to be considered a 'meaningful' assessment?

It was concluded that the impact assessment methods to be developed for SEA should, where relevant and possible, be consistent with EIA. For certain impacts/indicators this could lead to a situation where in SEA and EIA the same definitions and assessment principles could be applied at different scales and different levels of detail. Clearly, the advantage of such a situation would be that further methodological developments in the Cost Action could draw upon the knowledge and experiences from the EIA history.

However, for certain other impacts/indicators it should be expected that different definitions and assessment methods would have to be developed, since existing assessment principles would not be feasible at the higher abstraction levels which are common to SEA. For these situations, new possibilities are to be further explored and developed, for example based on:

- the use of aggregate (average) information on larger physical scales;
- the consideration of the condition and integrity of larger geographical, ecological or physical entities;
- the development of more qualitative assessment and evaluation procedures.

With respect to the scope of the development in the Cost Action, expectations are that the assessment of global impacts will be limited to a first order approach. The emphasis of the Cost Action will be on the regional/local adverse effects related to the natural and human environment. Particular challenges lie in the development of: the application potential of existing methods in relation to available information; new methodological approaches where available information is limited; and more sophisticated methods to improve assessment and evaluation capabilities.

The degree of attention to be directed towards the social and economic impacts related to the direct/indirect and distributional effects will be limited to providing an overview and description of impacts relevant for the policy and decision-making process, based on a country-related inventory.

The following briefly indicates some of the first order assessment possibilities and needs related to the global and regional/local adverse effects considered in table 1.

Global adverse effects

The assessment of the global adverse effects should be limited to a first order assessment. An actual assessment of global impacts is beyond the scope of the Cost Action. Because the effects are non-area specific, impact assessment methods could be rather straightforward. Estimates of traffic volumes (vehicle-km) related to planning options and air emission levels of relevant substances could be used to estimate total emissions. The global warming potential of these emissions could be assessed by applying weights reflecting differences in radiative forcing of the various substances. A similar procedure can be followed to assess the contribution to ozone depletion. Use of non-renewable energy consumption could be based on vehicle-km and energy use characteristics. Use of material and energy resources of structural options would follow from a specification and life cycle analysis of planning options.

Regional/local adverse effects

Emissions of relevant air and water and soil pollutants, waste production, noise and traffic accidents all relate to traffic volumes (vehicle-km) and vehicle characteristics (emission factors, life cycles, safety characteristics). Barrier effects, land uptake, soil erosion, hydrologic and hydraulic risks follow from the location, alignment, configuration and technical characteristics of planning options (e.g. tunnels or fly-overs versus ground level infrastructure). Land uptake is also directly related to specific dimensions (length and width) of infrastructure. Visual effects are related to infrastructure height. The actual impacts of these types of effects also strongly relate to the characteristics of the natural and human environment in affected zones, in terms of e.g. flora, fauna, habitats, population, houses, human activities, etc. Obviously, the first order and more sophisticated assessment of these types of impacts and indicators according to existing methods all require a degree of area or location specific information that may or may not be available at the planning levels considered.

3.4.2 Aggregation of impacts and indicators

For the interpretation and evaluation of impacts, the intention is to further integrate the impact assessment by aggregation of the various indicators. In this respect, a distinction is made in two steps of aggregation. The first step is to combine impacts within logical categories which are still 'meaningful' from the point of view of scientific interpretation. A further aggregation would be based on value judgments by politicians or interest groups. These two steps reflect the difference between an 'objective' and 'subjective' aggregation. It is not yet immediately clear how the separation between these steps is to be made. Therefore, in the further development of aggregation methods some clear criteria are to be developed to define the differences between these steps. The Cost Action would explicitly consider both steps, but presumably focus on the first step.

Based on the overview of potential effects and impacts, the following provides a preliminary identification of possible impact aggregation categories. These are to be further defined and explored within the continuation of the Cost Action.

Global impacts

- Global environment (climate, ozone).
- Energy and resource use.

Natural environment (regional/local)

- Quantity/quality of habitats and ecosystem integrity (impacts of pollution, noise, barrier effects, land losses, erosion, hydrology).

Human environment (regional/local)

- Human health and safety effects.
- Quality of life and general well-being (sensitive pollution, noise, barrier effects, hydrologic effects, effects on landscape, visual effects and aesthetics).

Possible methods are to be explored and developed by which the various indicators could be aggregated within impact aggregation categories, such as Life Cycle Analysis; weighting procedures based on relative contributions to impact categories; concepts related to environmental utilisation space (bubble concept) or carrying capacity. Based on such concepts it is conceivable that maximum admissible or minimal acceptable levels could be associated with certain aggregation categories.

3.5 Transport planning option parameters and assessment methods

The methods to be applied in the assessment of environmental indicators determine the information requirements related to the condition and performance of the transport systems to be evaluated. These information requirements will be referred to as *transport planning option parameters*, including parameters describing *traffic flows* and parameters describing the characteristics of *transport networks*, both of existing networks and extensions/modifications thereof as considered in the various planning options. These transport parameters are not merely involved with traditional engineering parameters, but would include a number of aspects related to the relevant impacts of traffic flows (for example vehicle-related emission, noise and safety characteristics). A third category of transport planning option parameters relate to the relevant characteristics of transport network (impact) zones, which are required for the

assessment of impacts to the natural and human environment. These parameters typically relate to types of land use, population densities, economic activities, etc., and will be referred to as *zone parameters*.

The following provides an overview of potentially relevant transport planning option parameters, to be considered as a generalised checklist. Within this overview, a distinction is made between traffic flow related parameters, transport network related parameters and zone parameters.

Traffic flow related parameters

Parameters pertaining to transport network links and routes by transport mode:

- Transportation speeds and travel times.
- Traffic volumes per time unit (cars, trucks, trains, ships, aircraft).
- Passengers and goods transported.

Characteristics of traffic flows by transportation mode and vehicle-km:

- Vehicle energy use characteristics.
- Vehicle emission characteristics related to relevant air water and soil pollutants.
- Vehicle noise emission characteristics.
- Vehicle safety characteristics.

Transport network related parameters

Parameters pertaining to different transport modes, including different transport infrastructure planning options:

- Alignments and transportation network configurations (in terms of connections, intersections, ramps, crossings, junctions, etc.).
- Dimensions (width, length) and associated capacity of existing and new transport links and constructions.
- Technical characteristics of existing and new infrastructure links and constructions, such as infrastructure elevation, (road) surface type, noise abatement provisions, etc.
- Material requirements related to both construction and operation/maintenance.
- Energy requirements related to construction, operation/maintenance and dismantlement.

Zone parameters

Parameters pertaining to activities in and characteristics of regional and local transport network zones for different transport modes:

- Inhabitants.
- Employees.
- Houses, buildings and public facilities.
- Production levels of goods and services.
- Types and extent of natural ecosystems and habitats.
- Cultural (historical) land values and assets.
- Valuable landscapes.
- Economic land values.

Transport planning option related assessment methods

The information requirements related to traffic flows may follow from more or less detailed analyses based on the use of transportation models (involving transport demand generation, modal split and route allocation). Characteristics of traffic flows may follow from fleet inventories and projections of fleet development and vehicle technology. More specific fields of expertise may be involved in assessing fleet characteristics related to emissions (pollutants and noise) and safety. The information on transport networks follows from the specification of infrastructure planning options. The specification of zone parameters may require the use of specific data processing and spatial data analysis techniques. These examples illustrate that, depending on the nature and scale of the planning options to be considered and the specification of impact assessment methods to be applied, a variety of assessment methods may be required to provide the necessary data inputs to the environmental assessment process.

4 Specification of work packages and work plan

4.1 Work packages

Following the initial specifications made in the Technical Annex, a key task of WG1 is the specification of the work packages to be considered in the further execution of the cost action. The basis for this specification is to be provided by the elaboration of the COST350 framework as described in chapter 3 of this document.

The main topics to be addressed in the work packages are:

- The identification and description of concrete transport infrastructure planning situations and options to which COST350 should be applied.
- The identification and definition of environmental impacts and indicators and the development of impact assessment methods.
- The specification of transport planning option parameters and the development of transport parameter assessment methods.

These issues correspond with the main elements of the framework described in chapter 3 (see figure 1) and are reflected in work packages WP2, WP3 and WP4, respectively.

In order to ensure the development and application of the overall methodology in COST350, additional work packages have been defined as follows:

- WP5: Aggregation of impacts/indicators and integration methods.
- WP6: Synthesis of COST350 methodology.

An overview of these work packages is provided in figure 3.

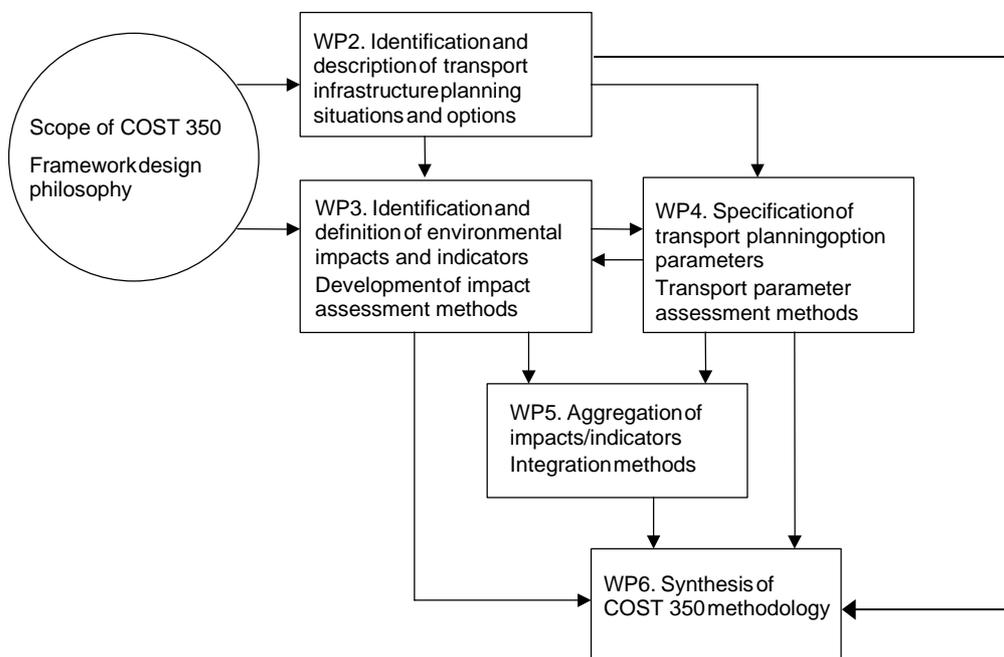


Figure 3 Overview of work packages

From figure 3 it follows there is some logical sequence of activities within the execution of the various work packages. However, the actual execution should be regarded as a dynamic approach, where developments within the work packages are to be closely co-

ordinated and re-iterated. This interdependency is especially strong for the methodological developments within work packages 4 and 5, and the synthesis and illustrations of the overall methodology in work package 6, as illustrated by the two-way arrows between these work packages in figure 3.

The following elaborates the contents of each of the work packages. An overview of the specific tasks and results of the work packages is provided in table 2.

WP2: Transport infrastructure planning situations and options

WP2 is concerned with the inventory (identification and description) of concrete transport infrastructure planning situations and options within each of the participating countries. These are to be described in terms of:

- the planning and decision-making process;
- the overall methodological approach;
- types and scope of measures considered in alternative planning options;
- scenario developments considered;
- the assessment of transport system characteristics (level of detail; specific parameters taken into account; types of models and data used);
- environmental and other impacts/indicators considered (specification of impacts and impact mechanisms; assessment methods; models and data applied);
- integration and evaluation methods applied;
- specific problems encountered.

The above specifications should be based on a limited number of concrete planning situations derived from relevant candidate cases identified for each country. In this respect, reference is made to the (preliminary) overview and description of candidate country case studies already compiled by the members of WG1 as a starting point for the activities of WG2 (which can be found on the COST350 website). The use of concrete case studies will direct the activities in WP2 to ensure that the inventory and specifications to be made will focus on actual country needs, and total efforts involved in this work package will be within acceptable limits.

Following the above processing of candidate case studies by country, the most appropriate case studies by country would be used in supporting the further methodological development.

In addition to the framework as developed in WP1, the activities in WP2 will provide an overview of present approaches and needs that will form an important basis for, and provide guidance to, the more specific inventories and specifications to be made in Work Packages 3, 4 and 5.

WP3: Environmental impacts/indicators and assessment methods

WP3 is involved with the specification and development of the environmental impact assessment system. The main tasks included relate to the identification and specification of:

- the environmental impacts to be considered; the relevant impact mechanisms defining the causal relationships which determine the nature, extent and interpretation of the impact; and the indicators to represent the various impacts;
- assessment methods to quantify the relevant indicators;
- data requirements for environmental impact assessment, in particular requirements related to transport planning options;
- research requirements related to the development of the environmental impact assessment system.

Specific attention should be given to the scope of the impact assessment, i.e. the extent and level of detail of assessment methods to be actually considered and developed in the Cost Action. Inputs for this are provided from the framework developed in WP1 and the results of the country-specific inventories and case specifications made in WP2.

Within the work package, available methods should be identified and evaluated and possible new methods are to be proposed. Data requirements related to the transport infrastructure planning options to be evaluated follow from the specifications of assessment methods to be applied.

An important consideration is to what extent methodological developments could actually take place in the Cost Action. These should be based on available knowledge and data, or on additional scientific research to be accommodated in the Cost Action, subject to available time and resources. Methodological developments which cannot be accommodated will lead to the identification of future research requirements.

WP4: Transport planning option parameters and assessment methods

Following the identification of methods and data requirements for impact assessment in WP3, WP4 is concerned with the identification and specification of concrete transport planning option parameters to be provided (related to traffic flows, transport networks and impact zones), as well as the required and available assessment methods.

Consequently, the core tasks in WP4 are:

- the inventory and identification of available models and tools to collect, estimate or compute the relevant transport planning option related parameters;
- the selection and specification of actual methods for the assessment of the relevant transport planning option parameters.

Important inputs for these tasks are provided by the country-specific inventories and cases resulting from WP2.

Given a comparison of specified data needs and actually available assessment possibilities, there will be an identification of remaining research requirements with respect to transport planning option related parameter assessment.

WP 5: Aggregation of impacts/indicators and integration methods

Within WP5, an inventory and review should be made of existing concepts and methods related to the aggregation of environmental indicators, in order to facilitate the interpretation and evaluation of the impact assessment in the decision-making process. In this respect, a distinction is made according to:

- 'objective' aggregation of environmental impacts based on formal approaches such as: Life Cycle Analysis, bubble concepts (environmental utilisation space), carrying capacity concepts; or other technically or scientifically based aggregation principles;
- 'subjective' aggregation and evaluation of impacts based on various forms of Multi Criteria Analysis.

In WP5 the possibilities for application and development of such methods are to be further explored, leading to the identification of operational concepts for application in COST350. In addition, WP5 should be involved with the exploration of existing methods for the integration and use of modelling procedures to actually support the decision-making process (referred to as *Decision Support Systems*). In particular, this task should be aimed at the development of an integrated process to assess and

evaluate the impacts of alternative planning options (including different sets of measures) considering different future developments (scenarios).

The identification and development of aggregation concepts and model integration issues builds on the specific results of the Work Packages 3 and 4 and should be closely related to the specific planning and decision-making processes for the relevant planning situations in the various countries (following from the inventories and case specifications made in WP2). Based on the findings in WP5 there will be an identification of remaining research requirements with respect to available aggregation and integration concepts.

WP 6: Synthesis of COST350 methodology

The actual development of the final deliverable of the COST350 Action takes place in WP6. This is the integrative synthesis of the findings and results in the Work Packages 2 to 5.

WP6 is based on a critical analysis of the various methodological options, which should ensure that a number of important conditions are met in 'assembling' the overall methodology. Such conditions may include:

- consistency of the methodology in terms of level of detail and reliability of methodological steps;
- applicability to the relevant planning situations in the various countries, ensuring a certain degree of homogenisation between countries;
- feasibility in terms of available information and efforts involved in applying the methodology.

Obviously, WP6 builds upon the results of all other work packages. However, in order to ensure the consistency and effectiveness of the activities in the other work packages, a certain degree of guidance should be supplied from WP6 to the other work packages. In this respect, WP6 should be viewed as the logical continuation of the activities in WP1 building upon, adjusting and improving the framework developed, and tuning the results of WP2-5 in order to achieve the final COST350 deliverable.

WP6 is responsible for producing the final deliverable of the Cost Action, i.e. the final report describing the overall COST350 methodology.

Table 2 provides an overview of specific tasks and results within the proposed work packages.

The following summarises the main relationships between the work packages as presently proposed.

- All work packages are clearly interrelated and should be closely co-ordinated and re-iterated. Particularly, there are strong interrelationships between WPs 3, 4 and 6.
- Case studies to be identified within the various countries would be the basis for the inventories and specifications in WPs 2 to 5, focusing the scope of the Cost Action and ensuring its relevance. A selection of case studies would be used to guide and test the development of the integrated COST350 methodology.
- Based on the framework developed in WP1, the inventories and specifications in WP2 will provide guidance and direction to the more specific, discipline-oriented developments in WPs 3-5.

- Further research needs are first identified within WPs 3, 4 and 5 and are summarised and prioritised in WP6.

The development of a dissemination plan would not necessarily be part of a specific work package. As a separate action, a communication and dissemination plan should be developed based on the results to be expected from the various work packages. The prime responsibility and co-ordination of this task should be assigned to a 'dissemination co-ordinator'.

Table 2 Tasks and results of proposed work packages

Work package		Tasks		Result/deliverable
Nr	Title	Nr	Description	
WP2	Transport infrastructure planning situations and options	2.1	Inventory of planning situations and planning options (spatial scales, measures, scenarios)	Description of country specific situation in terms of planning needs, approaches, data and tools
		2.2	Identification of case studies	Case studies to be used in methodological development and illustrative application
WP3	Environmental impacts/ indicators and assessment methods	3.1	Specification of impacts and impact mechanisms	Impact structure to be applied in COST350
		3.2	Specification of quantitative methods for assessment of indicators	Operational environmental impact assessment methods
		3.3	Identification of data requirements for environmental impact assessment	Data requirements for environmental impact assessment
		3.4	Specification of research requirements on environmental impact assessment	Environmental impact assessment related research requirements
WP4	Transport planning option parameters and assessment methods	4.1	Identification of required transport planning option parameters and required and available assessment methods	Required transport planning option parameters and assessment methods
		4.2	Selection and specification of transport parameter assessment methods	Operational transport parameter assessment methods
		4.3	Specification of research requirements on transport parameter assessment	Transport parameter assessment related research requirements
WP5	Aggregation of impacts/indicators and integration methods	5.1	Critical review of technically/scientifically based aggregation concepts	Available concepts for technical/scientific aggregation
		5.2	Review of concepts for subjective aggregation and evaluation	Available concepts for subjective aggregation and evaluation
		5.3	Review of issues related to integrated modelling process	Proposed concepts for integrated modelling process
		5.4	Specification of research requirements on aggregation and integration concepts	Research requirements related to aggregation and integration concepts
WP6	Synthesis of COST350 methodology	6.1	Development of COST350 final report	Proposed COST350 final report
		6.2	Identification and prioritisation of overall research requirements	Overview of specified and prioritised research requirements
		6.3	Drafting of final report	Final report on proposed COST350 methodology

Appendix 1

List of participants of meetings of WG1 in 2002

Name	Country
JOUMARD Robert	F
TOMLINSON Paul	UK
KERWICK-CHRISP Dean	UK
GERLACH Jürgen	G
ARAPIS Gerassimos	GR
MESZAROS-KIS Agnes	H
CACHON DE MESA Javier	E
CALDERON Enrique	E
DE BOCK Luc	B
HANOTEAU Yves	B
PRONELLO Cristina	I
WALCHER Alexander	A
ZOTTER Friedrich	A
KOSTER Martijn	NL
ROORDA-KNAPE Mirjam	NL
BAARSE Gerrit	NL

COST Secretariat:

Magnus Carle