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**Third Annual Thematic  
Research Summary –  
Infrastructure Provision  
(including TENs)**

**EXTR@Web Project**

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## Abbreviations and Acronyms Used

AG	High level Advisory Group (to the EXTR@Web project)
BG	Benchmark Group (associated with the EXTR@Web project)
CEC	Commission of the European Communities (= EC)
CEEC	Central and Eastern European Country
DG TREN	EC Directorate-General for Energy and Transport
EC	European Commission (= CEC)
EFTA	European Free Trade Association (Norway, Iceland, Switzerland, Liechtenstein)
ERA	European Research Area (EU, EFTA and CEECs)
EXTR@Web	Exploitation of Transport Research Results via the Web (DG TREN FP 5 Accompanying Measure project)
EU	European Union
FP 4 (5, etc)	EC Fourth (Fifth, etc) Framework Programme
GDP	Gross Domestic Product
GNSS	Global navigation satellite system
LCC	Life cycle cost
PAG	Programme Analysis Group (part of EXTR@Web project)
RAMS	Reliability, availability, maintainability, safety
RTD	Research and Technical Development
TEN	Trans-European Network
TEN-T	Trans-European Network(s) for Transport
TRKC	Transport Research Knowledge Centre; TRKC website at <a href="http://ec.europa.eu/transport/extra">ec.europa.eu/transport/extra</a>

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# 1. Introduction

This paper provides a structured guide to the results of Research and Technical Development (RTD) projects relating to **Infrastructure Provision (including TENs)**, carried out in transport research programmes throughout the European Research Area (ERA).

It is one of a series of 28 papers. Two further from an original set of 30 transport themes – i.e. Long-distance Transport and Financing Tools – have been discontinued as separate reports, though all related projects will be covered elsewhere in Thematic Research Summaries.

	Paper no.	Transport theme
Dimension 1	1.1	Passenger Transport
	1.2	Freight Transport
	1.3	Urban Transport
	1.4	Rural Transport
	1.5	Regional Transport
	1.6	EU Accession Issues
Dimension 2	2.1	Air Transport
	2.2	Rail Transport
	2.3	Road Transport
	2.4	Waterborne Transport
	2.5	Other Modes
	2.6	Intermodal Transport
Dimension 3	3.1	Economic Aspects
	3.2	Efficiency
	3.3	Equity and Accessibility
	3.4	Environmental Aspects
	3.5	User Aspects (incl. ergonomics, quality, choice and rights)
	3.6	Safety and Security
Dimension 4	4.1	Decision-support Tools
	4.2	Information and Awareness
	<b>4.3</b>	<b>Infrastructure Provision (incl. TENs)</b>
	4.4	Integration
	4.5	Intelligent Transport Systems
	4.6	Regulation / Deregulation
	4.7	Land Use Planning
	4.8	Transport Management
	4.9	Pricing, Taxation and Financing Tools
	4.10	Vehicle Technology

Of the more than 5600 projects from research programmes the Transport Research Knowledge Centre (TRKC) ultimately has considered, a total of **495** projects deal partly or fully with the issues of **Infrastructure Provision (including TENs)**.

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## 1.1 How to use this paper

It is recommended that you use this paper to locate RTD (Research and Technical Development) results on sub-themes where you have a particular interest, rather than reading the paper from start to finish:

- Start in Section 2 to get an overview of the scope of the particular theme.
- Read Section 4 that summarises the findings for each sub-theme of interest to you.
- Consult Annex I to identify the individual projects, be they of European or national origin, relating to a particular sub-theme.
- If this is the first time you have used one of the series of thematic research summaries, it is strongly recommended that you read Annex II. This explains the background and purpose of the EXTR@Web project, and the basis upon which information in this document was selected and analysed.

The other sections of this paper can help you to gain an overall picture of the **Infrastructure Provision** theme, associated policy issues and the background of the EXTR@Web project.

The analysis in this paper is the responsibility of the EXTR@Web project team, and does not necessarily represent the official viewpoint of the European Commission.

## 1.2 The link to the Transport Research Knowledge Centre website

Further details on individual projects can be obtained from the Transport Research Knowledge Centre (TRKC) website at: [ec.europa.eu/transport/extra](http://ec.europa.eu/transport/extra)

The TRKC website includes summaries and full final reports of individual projects, as well as a variety of analyses, and publications prepared by the EXTR@Web project.

How to best use the online resource:

- The 'Projects & Analysis' section allows the user to specify a project-wide search on 'Publication date', 'Origin', 'Document type', 'Mode', 'Sector', 'Geographic area', 'Policy objective' and 'Tool', or any combination of these criteria.
- This may be complemented, or superseded, by the flexible 'Free text search'.
- On the query result screen, free text search criteria may be refined, as appropriate. Further tick boxes here allow limiting query results according to 'Project status' (five levels).
- Query results are presented in a table, which allows for sorting by column (click on relevant column header for alphanumerical sorting).
- Project-specific summaries may include links to project websites, or provide contact details for the project, where available.

It should be noted that the online Transport Research Knowledge Centre will be updated frequently, though dependent on input from project co-ordinators.

Other parts of the TRKC website cover transport research at Programme level, and expand on transport related issues, e.g. in the 'Links', 'Events', 'Glossary' and 'FAQs' sections.

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## 2. Scope of theme

### 2.1 Definition of theme

**Infrastructure Provision** is concerned with the planning, financing, design, construction, operation and maintenance of transport infrastructures for all modes. It includes both physical networks and information and communication networks. Physical networks include the right of way and the facilities at the access/egress points and at the points where modal transfers occur. Information and communication networks support the management of traffic flows and the provision of information.

The development of interoperable **Trans-European Networks** (TENs) covering all modes is a key part of the EU strategy for the creation of the Single Market, the Objective 1 regions and the Accession Countries.

### 2.2 Topics included in theme

A first topic is the cost-effective development and maintenance of infrastructure. Research in this area aims at enhancing infrastructure reliability and durability in road and rail transport. Demands on infrastructure maintenance and monitoring are increasing as a consequence of the increasing traffic loads and, in the case of railways, increasing speeds. Research includes new materials for road pavement, management of road maintenance, methodologies for life-cycle cost assessment, reliability-centred systems for infrastructure management. Technologies for the infrastructure of underground freight distribution systems are a further, although minor, area of research.

A second topic is the development of innovative technological and operational solutions for nodal points. Research in this area aims to reinforce intermodal links with special emphasis on easing, improving and facilitating cargo flows between inland and sea. Research includes the design and management of freight terminals, the development of new technologies for transshipment, the planning, financing and operations of passenger interchanges.

A third topic is the development of a European information and communication infrastructure which supports traffic management and the provision of information services across borders and operators. This includes:

- The European satellite system Galileo, for navigation and positioning;
- systems for electronic fee collection on roads;
- information systems for intermodal freight transport based on tracking and tracing systems; and
- vessel traffic management and information systems.

Research contributes to the development of the trans-European transport network (TEN-T) by providing support for the planning and financing of the investment programme and the development of new infrastructure and services.

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This includes:

- Evaluation methodologies and software tools to help policy makers assess the impacts of different infrastructure plans;
- assessment of new solutions for the efficient operations of networks and terminals, in particular traffic management systems and technologies for freight terminals;
- specifications for technical and administrative interoperability within modes (especially rail) and across modes; and
- models for private sector participation in the financing and management of infrastructure.

The above summary of topics describes the principal breakdown of technical, organisational and managerial aspects that come under the theme, whereas Chapter 4 of this document reflects sub-themes according to actual priorities in transport research policy.

## 2.3 Significance of theme

Transport as well as communication networks serve the common role of overcoming the friction of distance in an economy where production systems are becoming ever more integrated and geographically dispersed. Turning the patchwork of transport infrastructure into a truly trans-European network is vital for the economic and social cohesion of the EU. The Trans-European Network for transport was therefore incorporated into the Maastricht Treaty as a major policy objective.

The first fourteen investment projects to develop such a network were identified in 1994 by the Christophersen Group. The aim was to create trans-European routes for all modes of transport concentrating essentially on cross-border projects to link-up separate national systems. In addition to building new links, a major objective has been to upgrade the existing networks and make better use of the existing capacity. Therefore the deployment of Intelligent Transport Systems (ITS) has had a prime position in the EU strategy.

Priorities for infrastructure projects have included multi-modal corridors for freight, a rapid passenger network and traffic management plans for major roads. Mechanisms for involving the private sector in order to mobilise financial capital are still an important concern. The extension of the trans-European network to the countries of Central and Eastern Europe is today a key challenge together with removing major cross-border bottlenecks, particularly in the rail sector, like Alpine crossings or passages through the Pyrenees.

By 2003 only three of the fourteen projects identified as priorities had been finished. A new proposal for the development of the trans-European transport network has been put forward by the Van Miert High Level Group in June 2003. The proposal has identified priority projects that contribute most to promoting trans-national traffic on the major trans-European axes. The priorities include the Galileo satellite navigation system, the development of motorways of the sea, the interoperability of trans-European networks, the development of freight-dedicated rail networks and the removal of airport capacity constraints.

Late in 2003 the European Commission identified a “Quick-start Programme” of projects as part of the European initiative for growth based on four selection criteria: maturity of the

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project, trans-frontier dimension, impact on growth and innovation in an enlarged Europe and benefits for the environment. 30 priority projects were then approved by the European Parliament and the Council in April 2004.

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### 3. Policy context

Significant progress has been made since the first fourteen investment projects to develop the Trans-European Transport Network were identified in 1994 (adopted by the Essen European Council in December 1994).

The guidelines on the development of the Trans-European Transport Network issued with the Decision 1692/96/EC of the European Parliament and the Council, included in the TENs the infrastructures (roads, railways, waterways, ports, airports, navigation aids, intermodal freight terminals and product pipelines) together with services necessary for the operation of these infrastructures. Criteria were provided to identify the networks, in the different modes, that are of relevance to the TENs.

The guidelines identified the following as priority measures:

- Completion of the connections needed to facilitate transport;
- optimisation of the efficiency of the existing infrastructure;
- achievement of interoperability of network components; and
- integration of the environmental dimension into the network.

In the contribution to the Gothenburg European Council the Commission [1] called for a shift of balance between the modes by way of an investment policy in infrastructure geared to the railways, inland waterways, short sea shipping and intermodal operations.

The White Paper “European Transport Policy for 2010: Time to Decide” [3] suggested the option of gradually breaking the link between economic growth and transport growth within a context where:

- Greater needs for mobility will automatically be generated by economic growth;
- an explosion in transport flows in the new Member States, particularly in border regions, will be generated by enlargement; and
- massive investment will be required by saturation of the major arteries combined with accessibility of outlying and very remote areas and infrastructure upgrading in the new Member States and candidate countries.

Among the priorities the White Paper included:

- Revitalising the railways by a network of railway lines dedicated exclusively to goods services, so that, commercially, railway companies attach as much importance to goods as to passengers;
- promoting short sea shipping and inland waterways by the building of sea motorways and the inclusion in the Trans-European Network of certain shipping links, particularly those providing a way round bottlenecks (the Alps, Pyrenees and Benelux countries followed by the German-Polish border in the future);
- establishing Community legislation on air traffic to reduce over-fragmentation of the European air traffic management systems and ensuring expansion of airport capacity compatible with the environment; and
- turning intermodality into a competitive, economically viable reality with technical harmonisation and interoperability between systems, particularly for containers.

To speed up the development of the Trans-European Transport Network the White Paper anticipated a Commission proposal for amendment of the Community guidelines adopted

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in the Decision by the Council and the European Parliament in 1996. The revision focus was identified in concentrating the guidelines, in a first stage, on:

- Removing the bottlenecks in the railway network, with priority to freight;
- greater integration of high-speed lines with air transport;
- introduction of traffic management plans on the main road arteries;

And, in a second stage, on:

- Introducing the concept of motorways of the sea;
- developing airport capacity;
- completing the routes identified as priorities for absorbing the traffic flows generated by enlargement, particularly in border regions; and
- improving access to outlying areas.

The revision of the list of the fourteen priority projects adopted by the Essen European Council and included in the 1996 Decision on the guidelines was also suggested, with the addition of new projects like Galileo.

Regarding the financing of infrastructure, the White Paper proposed:

- A change for the funding rules for the Trans-European Network, increasing to 20% the maximum Community contribution for cross-border projects crossing natural barriers and the projects at the borders of new and candidate Member States; and
- establishment of a Community framework to channel revenues from charges on competing routes towards the building of new infrastructure, particularly rail.

Regarding technical regulations, the White Paper proposed:

- The harmonisation of minimum safety standards for road and rail tunnels, forming part of the Trans-European transport Network; and
- a directive designed to guarantee the interoperability of toll systems on the Trans-European Road Network.

A number of initiatives have followed up the proposals in the White Paper.

A Decision of the Council was taken in March 2002 to support the development plans of Galileo. To this aim, the Galileo Joint Undertaking was set up, together with the European Space Agency, in May 2002.

A proposal for a Directive on the minimum safety requirements for tunnels in the Trans-European Road Network was presented in 2002 [4].

The most adequate tools to support the investments in the Trans-European Transport Network were analysed in a Communication in 2003 [5]. In particular, the Communication addressed the Community financing sources, the interventions which showed the highest difficulties, namely the cross-border railway projects particularly in the Alps and the Pyrenees, and the pros and cons of private-public partnerships.

The Communication also proposed a directive on the widespread introduction and interoperability of electronic road toll systems. Among the three technologies (i) new satellite positioning GNSS, (ii) mobile communications GSM/GPRS, and (iii) microwaves, the first two are given preference because they enable the number of kilometres travelled to be counted and at the same time open the door to new safety and information services for travellers, such as the automatic alarm triggered by a vehicle involved in an accident and indicating its position, and real-time information on traffic conditions and journey times. A time table is set for adoption by network managers of a “European electronic toll

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services”, first offered to vehicles exceeding 3,5 tonnes and vehicles carrying more than 9 passengers, and subsequently to all types of vehicles.

In July 2003 the Commission presented a proposal [6] to amend the Eurovignette Directive (Directive 1999/62 on the charging of heavy goods vehicles for the use of certain infrastructures) with the aim to change the framework for tolls and vignettes for goods vehicles over 3,5 tonnes. In addition, the proposal allows the Member States to apply mark-ups to tolls in particularly sensitive areas to cross-finance the investment costs of other transport infrastructures – railways - of a high European interest in the same corridor or area. Following this proposal, the EU has finalised in 2006 the approval of a new road charging directive for the introduction of modulated tolling for freight vehicles.

On the basis of the results of the activities of the Van Miert Group, the Commission presented in autumn 2003 the amended proposal for the revision of the Community guidelines on the development of the Trans-European transport Network [7] and the rules for the granting of financial aids [8]. The proposals included:

- A list of 29 priority projects (which included 3 Essen projects already complete);
- the definition of motorways of the sea; I
- the granting of a European label to the priority projects to give priority use of the Community resources available and access to co-ordinated evaluation and public consultation procedures;
- a mechanism aimed at closer co-operation and financial co-ordination between the Member States, notably by the designation of European co-ordinators; and
- the amendment of Regulation 2236/95 to allow Community co-financing of up to 30% of the total cost for cross-border sections of projects declared to be of European interest.

The mid term review of the White Paper [9] states that the future transport policy will need to optimise each transport mode’s own potential to meet the objectives of clean and efficient transport systems. Shifts to more environmentally friendly modes must be achieved where appropriate, in particular on long-distance, in urban areas and on congested corridors. Co-modality, i.e. the efficient use of different modes on their own and in combination will result in an optimal and sustainable utilisation of resources.

It is recognised that intelligent mobility solutions and transport demand management based on smart charging will alleviate congestion but new or improved infrastructure will also be needed. Investment in viable alternatives to congested road corridors can support intelligent solutions involving co-modal logistic chains which optimise the use of transport infrastructure within and across different modes. This includes transalpine tunnels, rail corridors and intermodal nodes for rail, sea and air transport.

The review puts an increased emphasis on intelligent transport systems and on the potential of Galileo in promoting new technologies. The development of the European port policy is announced for 2007. This will have as one of its goals increased investment within ports and towards hinterland. The review also announces a methodology as a basis for smart infrastructure charging across all modes by 2008.

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## 4. Synthesis of findings from completed projects

Research projects contributing to the theme of **Infrastructure Provision (including TENs)** can be broken down to the following sub-themes:

- Infrastructure construction and maintenance – road;
- infrastructure construction and maintenance – rail;
- infrastructure technologies – underground freight distribution;
- European intelligent infrastructure;
- interconnection of multi-modal networks for freight;
- passenger interchanges; and
- development of the Trans-European Transport Network.

You may wish to further consult the following Thematic Research Summaries that present research findings which are complementary to those covered in this paper:

- D2.E-2.1 Air Transport;
- D2.E-2.2 Rail Transport;
- D2.E-2.3 Road Transport;
- D2.E-2.4 Waterborne Transport;
- D2.E-2.6 Intermodal Transport;
- D2.E-4.1 Decision Support Tools;
- D2.E-4.5 Intelligent Transport Systems; and
- D2.E-4.9 Pricing, Taxation and Financing Tools.

Results from the following **11** projects have been included in this Thematic Research Summary:

Research sub-theme	Contributing projects
Infrastructure construction and maintenance – road	None yet.
Infrastructure construction and maintenance – rail	CRMA; PROMAIN
Infrastructure technologies – underground freight distribution	None yet.
European intelligent infrastructure	GALILEAN
Interconnection of multi-modal networks for freight	EUTPII
Passenger interchanges	LEONARDO; Rapid construction of passenger interchanges
Development of the Trans-European Transport Network	ALP-NET; COST340; IASON; INDICATORS; INTERMODA

Detailed findings and policy implications for individual projects can be found in Annex I. Please refer to acronyms and project titles, respectively, listed above.

## 4.1 Infrastructure construction and maintenance – road

### 4.1.1 Research objectives

In this area research objectives include identifying new technological and management solutions for cost-effective infrastructure maintenance in road transport.

### 4.1.2 Main findings

None yet.

## 4.2 Infrastructure construction and maintenance – rail

### 4.2.1 Research objectives

In this area research objectives include identifying new technological and management solutions for cost-effective infrastructure maintenance in rail transport.

### 4.2.2 Main findings

European research carried out a review of the use in the railway sector of life cycle cost (LCC) techniques. It was found that they are generally used to ensure that equipment meets the reliability, availability, maintainability, safety (RAMS) and cost performance requirements agreed by the contract as well as to develop maintenance plans in order to minimise the total cost of operation. The need for the introduction of a standard LCC methodology to achieve consistency as in the quality assurance programmes was underlined.

Subsequent European research has investigated construction principles, in particular slab tracks for high-speed trains, management and safety approaches. Research concluded that European rail freight suffers from bad communication across borders and that the potential of LCC for cost reduction is not exploited. It was suggested that each company needs to tailor its outsourcing strategy to guarantee full control of RAMS. Recommendations were provided on realisation of highly performing tracks, increase of efficiency of maintenance and management, and achievement of interoperability.

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### **4.3 Infrastructure technologies: underground freight distribution**

#### **4.3.1 Research objectives**

In this area research objectives include reviewing technologies for the construction of infrastructure of automated underground distribution and tube transport systems.

#### **4.3.2 Main findings**

None yet.

### **4.4 European intelligent infrastructure**

#### **4.4.1 Research objectives**

In this area research objectives include developing the European satellite navigation and positioning system Galileo, developing European systems for electronic fee collection.

#### **4.4.2 Main findings**

European research has produced a roadmap for the promotion of GNSS (Global navigation satellite system) applications in Europe. The roadmap addresses political and institutional issues, business-related issues, as well as technological topics. The roadmap discusses in depth the dependence of further developments on the political and institutional environment. A set of actions were recommended including the integration of Galileo and other GNSS systems into a coherent radio-navigation policy, with a view to ensuring a reliable and robust positioning service for Europe. Another recommendation was the implementation of the Public Regulated Service for specific civil or military user groups, in particular with a view to the future military GPS service.

### **4.5 Interconnection of multi-modal networks for freight**

#### **4.5.1 Research objectives**

In this area research objectives include identifying new technical and operational solutions for freight terminals and in particular the seaport-hinterland interface.

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#### 4.5.2 Main findings

European research reviewed the potential for the improvement of the efficiency of intermodal freight transfer points. Priority topics for improving the productivity of intermodal freight transport were identified. These include new public and private investment strategies and new strategies for network integration such as the logistics integration of the entire chain. From the infrastructure, transport equipment and transfer means standpoint, successful technology development and innovation are key as well as standardisation of loading units. In terms of information and communication systems, better integration of existing and future systems is needed. This should be based on internationally agreed process and message standards. Logistics management tools are required to cover the whole transport chain.

### 4.6 Passenger interchanges

#### 4.6.1 Research objectives

In this area research objectives include good practice in planning, financing and operating passenger interchanges including airports.

#### 4.6.2 Main findings

European research investigated the feasibility of the integration of existing ground, arrival and departure planning and management tools at airports. Experimentation under real operating conditions could demonstrate that benefits in terms of improved efficiency of airport operations can be achieved. Both technical recommendations, addressing the system design and implementation, and functional recommendations, addressing the operational use of the system, were provided.

Research in the UK produced design specifications for quickly-built stations. Potential applications include passenger interchanges for rail, bus, tram and light rail systems. The implied philosophy is to restrict the on-site construction activities to site preparation and installation of foundations. Research identified elements for the design of modular interchanges. Assembly of the station platforms, ancillary shelters and over-bridges may then be achieved in a single weekend.

### 4.7 Development of the Trans-European Transport Network

#### 4.7.1 Research objectives

In this area research objectives include assessing the potential of dedicated freight railway networks, inland waterways and sea motorways, assessing alternative developments for pan-European corridors, providing guidelines on the implementation of public-private partnerships.

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#### 4.7.2 Main findings

European research has produced performance indicators for the TEN-T. Indicators cover all modes and are meant to measure progress towards eight general policy goals. The proposed indicators should be part of a new monitoring framework to report on the status of the TEN-T which should extend the existing Infrastructure Reporting mechanism. Also, the indicators can be used for planning aims. Among the suggestions for further actions are a pilot survey on TEN-T, the definition of data quality levels and the specification of concrete target statements for the trans-European transport policy.

European research looking at methodologies for the assessment of broader economic effects of transport investments found that the TEN-T programme has only minor impacts on GDP. However the distributive effects were found to be significant, in particular in terms of East-West growth balance and stimulus to rate of cohesion. For regions at the European periphery suffering from an underdeveloped transport network a gain in accessibility by a new motorway or railway line can bring significant progress in economic development. Research addressing in particular trans-Alpine transport produced an assessment of the policies which could be supported at EU level including intermodality and pricing. Effectiveness with regard to modal split, congestion and environmental externalities, as well as barriers to practical implementation were investigated.

A strand of European research looked at the development of intermodality in Europe. One project contributed to the understanding of the current issues involved in the creation of a European intermodal transport network, of the conditions that would make it possible and of the obstacles encountered to date. In particular the research dealt with the attitudes of the different actors and with technological issues. Another project contributed to the identification of measures for the development of intermodality between EU and the CEECs. Analysis addressed market determinants and regulatory framework conditions.

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## 5. References

- [1] EXTR@Web project: 'Transport Research Knowledge Centre (TRKC) website' ([ec.europa.eu/transport/extra](http://ec.europa.eu/transport/extra)), 2004-2006, Brussels
- [2] CEC(2001) A Sustainable Europe for a Better World: a European Union Strategy for Sustainable Development (Commission's proposal to the Gothenburg European Council). COM(2001)264, Brussels.
- [3] CEC(2001) European Transport Policy for 2010: Time to Decide, White Paper. COM(2001)370, Brussels.
- [4] CEC(2002) Proposal for a Directive of the European Parliament and the Council on Minimum Safety Requirements for Tunnels in the Trans-European Road Network. COM(2002)769, Brussels.
- [5] CEC(2003) Developing the Trans-European Transport Network: Innovative Funding Solutions, Interoperability of the Electronic Toll System. Proposal for a Directive of the European Parliament and the Council on the Widespread Introduction and Interoperability of Electronic Road Toll Systems in the Community. COM(2003)132, Brussels.
- [6] CEC(2003) Proposal for a Directive of the European Parliament and of the Council amending Directive 1999/62/EC on the charging of heavy goods vehicles for the use of certain infrastructures. COM(2003)448, Brussels.
- [7] CEC(2003) Amended Proposal for a Decision of the European Parliament and the Council amending Decision 1692/96/EC on Community Guidelines for the Development of the Trans-European Transport Network . COM(2003)564, Brussels.
- [8] CEC(2003) Amended Proposal for a Regulation of the European Parliament and of the Council Amending the Amended Proposal for a Regulation of the European Parliament and of the Council Amending Council Regulation (EC) No 2236/95 Laying Down General Rules for the Granting of Community Financial Aid in the Field of Trans-European Networks. COM(2003)561, Brussels.
- [9] CEC(2006) Keep Europe moving – sustainable mobility for our continent. Mid-term review of the European Commission's 2001 Transport White Paper. COM(2006)314, Brussels.

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## Annex I: Contributing projects

Preface This Annex lists all the projects (European and national) which belong to the **Infrastructure Provision (including TENS)** theme, in alphabetical order of project acronym (for projects with acronyms), followed by projects without acronyms in alphabetical order of the project's name in English. Where results have been made available to the EXTR@Web project, a summary of key findings and policy implications relevant to this theme are given.

In 'Origin' column, use ISO 3166-1 country designators as follows:

Austria – AT; Belgium – BE; Bulgaria – BG; Cyprus – CY; Czech Republic – CZ; Denmark – DK; Estonia – EE; European – EU; Finland – FI; France – FR; Germany – DE; Greece – GR; Hungary – HU; Iceland – IS; International – INT; Ireland – IE; Italy – IT; Latvia – LV; Lithuania – LT; Luxembourg – LU; Malta – MT; Netherlands – NL; Norway – NO; Poland – PL; Portugal – PT; Romania – RO; Slovakia – SK; Slovenia – SI; Spain – ES; Sweden – SE; Switzerland – CH; United Kingdom – UK; Other countries – Oth

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<b>ALP-NET</b>	Thematic network on trans Alpine crossing	EU	Development of the trans-European transport network
<p><u>Key findings</u></p> <p>The project assessed the potential of intermodal and combined transport. The main problems of intermodal and combined transport are technical and organisational problems including:</p> <ul style="list-style-type: none"> <li>• The interoperability of rail services;</li> <li>• the capacity optimisation of the existing systems;</li> <li>• the lack of reliability which concerns primarily the railways;</li> <li>• the insufficient construction of new terminals;</li> <li>• problems in efficiency of border crossing operations;</li> <li>• the organisation of the rolling road and in this connection the role of base tunnels; and</li> <li>• the instalment of a supportive regulatory framework for the development of combined and intermodal transport, which also allows for the financing of relevant infrastructure projects (railway, terminals, etc.).</li> </ul> <p>Improving the quality and flexibility of the intermodal chain will be the only way to convince users and, in particular, shippers and road operators that combined transport is an alternative to road transport. Regarding pricing and financing of transport infrastructure it was found that there still exists no consensus on the method and the database to be used for defining the level and the structure of taxes and prices. This applies especially to:</p> <ul style="list-style-type: none"> <li>• The valuation of environmental externalities;</li> <li>• the degree of harmonisation of pricing structures and levels as well as charging technologies among the Alpine regions, but also between Alpine and non-Alpine regions;</li> <li>• the incorporation of financing needs into the pricing scheme; and</li> <li>• the modelling of the impacts of pricing on route and mode choice.</li> </ul> <p>A new framework directive is expected to clarify matters. How the revenues of pricing are to be used; whether these will be channelled to general revenues or not, and the possibility of cross-subsidising across modes, remain open questions.</p> <p><u>Policy implications</u></p> <p>No single policy instrument is sufficient on its own to overcome the problems faced by trans-Alpine transport. Thus whilst both combined transport and pricing promise to ameliorate the situation with regard</p>			

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<p>to modal split, congestion and environmental externalities, their application needs to be combined and possibly also co-ordinated, spatially as well as temporally. Temporal co-ordination involves considering the phasing of policies in such a way so as to deal with immediate and short-term problems to the maximum extent possible. Spatial co-ordination involves a higher degree of collaboration among Alpine countries and regions so as to avoid the "Not in my Back Yard (NIMBY)" syndrome whereby unilateral or bilateral decisions lead to an amelioration of the situation in a specific country or over one particular crossing but to no positive results, or indeed a worsening of the situation in another country or at another crossing. Both Switzerland and France have defined targets about the desired amount of traffic through their crossings and hope to achieve these through a set of measures, with pricing, rail development and combined transport at the core. The discussion suggested that additional measures which might be needed could include:</p> <ul style="list-style-type: none"> <li>• The imposition of absolute limits (on the total amount of the transport volume across the Alps, or with regard to night and weekend bans);</li> <li>• the extension of pricing measures for heavy vehicles to cover the full European road network (rather than just the motorway network) and the increase of road pricing charges;</li> <li>• the extension of pricing measures to apply also to passenger cars; and</li> <li>• the consideration of alternative routes either with regard to both road and rail across other countries (for instance through Austria or Slovenia/Hungary) or with regard to maritime transport; the latter would need to consider the role of the ports, in particular the Italian and Dutch ports.</li> </ul> <p><u>Project contact</u> <a href="mailto:l.giorgi@iccr-international.org">l.giorgi@iccr-international.org</a></p>			
<b>COPAT3</b>	Competence of Pavement Assessment Techniques - Phase 3	UK	Infrastructure construction and maintenance – road
<p><u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=650">www.ha-research.co.uk/projects/index.php?id=650</a></p>			
<b>COPAT4</b>	Competence of Pavement Assessment Techniques - Phase 4	UK	Infrastructure construction and maintenance – road
<p><u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=973">www.ha-research.co.uk/projects/index.php?id=973</a></p>			
<b>COST 337</b>	Unbound granular materials for road pavements	EU	Infrastructure construction and maintenance – road
<p><u>Project website</u> <a href="http://www.cordis.lu/cost-transport/src/cost-337.htm">www.cordis.lu/cost-transport/src/cost-337.htm</a></p>			
<b>COST 340</b>	Towards a European intermodal transport network: lessons from History	EU	Development of the trans-European transport network
<p><u>Key findings</u></p> <p>Key lessons are as follows:</p> <ul style="list-style-type: none"> <li>• Inter-modal transport as transport organisation has been inefficient up to date. Competition was first understood, and has been from the 19th Century onwards, as a matter of one transport mode supremacy. The only possible relationship between transport systems was competition between self oriented transport modes, which could be substituted to each other, but not easily combined.</li> </ul>			

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<ul style="list-style-type: none"> <li>The development of inter-modal transport was hindered by the logic of technology related to each mode, which developed together with the transport networks.</li> <li>The role played by the 'actors' on the transport stage: public authorities and customers. It is underlined the conservative influence of transport administration itself which shows its preference of one-mode transport before inter-modal transport in its organisation.</li> </ul> <p><u>Policy implications</u></p> <p>Thanks to this COST Action, successes, deficiencies and mistakes inherited from the past are highlighted. Europe will thus be able to take these elements into account and gain some time in the implementation of trans-national infrastructures (missing links), and of integrated inter-modal transport networks and chains.</p> <p><u>Project website</u></p> <p><a href="http://cordis.europa.eu/cost-transport/src/cost-340.htm">cordis.europa.eu/cost-transport/src/cost-340.htm</a></p>			
<b>COST 343</b>	Reduction of road closures by improved maintenance procedures	EU	Infrastructure construction and maintenance – road
<p><u>Project website</u></p> <p><a href="http://www.cordis.lu/cost-transport/src/cost-343.htm">www.cordis.lu/cost-transport/src/cost-343.htm</a></p>			
<b>COST 344</b>	Improvements to snow and ice control on European roads and bridges	EU	Infrastructure construction and maintenance – road
<p><u>Project website</u></p> <p><a href="http://www.cordis.lu/cost-transport/src/cost-344.htm">www.cordis.lu/cost-transport/src/cost-344.htm</a></p>			
<b>COST 345</b>	Procedures required for assessing highway structures	EU	Infrastructure construction and maintenance – road
<p><u>Project website</u></p> <p><a href="http://www.cordis.lu/cost-transport/src/cost-345.htm">www.cordis.lu/cost-transport/src/cost-345.htm</a></p>			
<b>COST 347</b>	Pavement research with accelerated loading testing facilities	EU	Infrastructure construction and maintenance – road
<p><u>Project website</u></p> <p><a href="http://www.cordis.lu/cost-transport/src/cost-347.htm">www.cordis.lu/cost-transport/src/cost-347.htm</a></p>			
<b>COST 348</b>	Reinforcement of pavements with steel meshes and geosynthetics	EU	Infrastructure construction and maintenance – road
<p><u>Project website</u></p> <p><a href="http://www.cordis.lu/cost-transport/src/cost-348.htm">www.cordis.lu/cost-transport/src/cost-348.htm</a></p>			
<b>COST 351</b>	Water movement in road pavements and embankments	EU	Infrastructure construction and maintenance – road
<p><u>Project contact</u></p> <p><a href="mailto:kent.gustafson@vti.se">kent.gustafson@vti.se</a></p>			

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<b>CRMA</b>	Cost, reliability, maintenance and availability	EU	Infrastructure construction and maintenance – rail
<p><u>Key findings</u></p> <p>Experiences in railway and other industries have shown that the motivation for introducing LCC techniques is commercial and mainly due to increasing competitive pressure to reduce costs. Results from the railway industry show that there is limited application of LCC techniques. These are generally used to ensure that equipment meets the reliability, availability, maintainability, safety (RAMS) and cost performance requirements agreed by the contract, as well as to develop maintenance plans in order to minimise the total cost of operation. Results from non-railway industries show that the application of LCC procedures is a lengthy and costly process. Strong mutual links between supplier and user especially with regard to data exchange, the need for cultural change within the company, strong and skilful top management involvement and the measurement of progress are cited as key requirements for success. The initial uses of LCC techniques in the railway sector identified some problems relating to the RAMS terminology and the financial analysis of the results. A test on a freight braking system carried out in CRMA has shown the need to take a total system approach as well as the links between vehicle costs, operational issues, safety, infrastructure costs and environmental issues.</p> <p><u>Policy implications</u></p> <p>Good assessment of costs is part of an overall strategy to put interoperability as a standard for working and to improve the return on investment of the European railway network. Regulations that govern the international interoperability of vehicles need to be reviewed to ensure that they provide for the lowest cost of maintenance of vehicles and greater utilisation. Together with a need for harmonising definitions and methodology used for LCC calculations, using the same terminology, definitions and financial assessment criteria, it would be beneficial to introduce a standard LCC method to give consistency in a similar way to that achieved by quality assurance programmes. The terminology definition is being addressed by the development of CEN standards, though care is to be taken to ensure consistency between the various working groups. The limits of the services and responsibility of each actor should be clearly stated to ensure and guarantee good relationships between them. Further use of LCC techniques needs to take a system view so that major items of equipment are not sub-optimised to the detriment of the system overall. The UIC intends to apply LCC techniques on a wide spectrum of activities in order to achieve reduced costs, greater efficiency and larger market share.</p>			
<b>EUTP II</b>	Thematic Network on Freight Transfer Points and Terminals	EU	Interconnection of multi-modal networks for freight
<p><u>Key findings</u></p> <p>Elementary knowledge on intermodal terminal network on European level is lacking. There is no common view of financing of intermodal terminals at the European level. Every country has different financing systems. Earning potential for investors is not clear. An innovative use of inland waterways besides road-rail intermodal transport is needed to meet the challenges of the future. The terminal should be considered as just one element of the complete door-to-door intermodal chain, and therefore terminal issues, especially as far as costs are concerned, should be evaluated within the general framework of the complete integrated transport chain. Overview of previous EC research on intermodal transport and terminals gives the result that most of last decade's research has focussed on the terminal and transshipment technologies which do not appear to be the main problem. The economic and efficient performance of the facility as part of the overall logistics chain is key for competitive terminals operating at</p>			

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<p>a high quality service level and integrated within the transport network. Standardisation is important mean to reach interoperability between modes, infrastructure, equipment, involved partners etc, to liberalize the procurement of services and products and to reach high quality services.</p> <p>One of the main issues in information and communication systems is the relation between requirements arising from the chain management perspective and solutions provided by nodes such as freight transfer points. Key elements are harmonisation of procedures and IT interfaces for clients, i.e. the users of transport services, in order to ease the way of generating and retrieving information, integration of systems instead of replacement and use of EDI and web-based technology.</p> <p><u>Policy implications</u></p> <p>The most important future topics for improving the productivity of intermodal freight transport were identified.</p> <p>I) European intermodal terminal network</p> <ul style="list-style-type: none"> <li>• Basic knowledge of intermodal terminal network on European level is lacking.</li> <li>• There is no common view of financing for intermodal terminals.</li> <li>• Intermodal terminals are not directly connected to the TEN-T network.</li> </ul> <p>II) Quality of services</p> <p>Quality negotiations underway with traditional railways but no real results have been attained yet.</p> <p>III) Security (in the terminal and along the chain). Security is the priority challenge now. This requires a comprehensive research of existing regulations at an international level. Risk assessment along all points in the chain needs to be undertaken.</p> <p>IV) Organisation between actors</p> <ul style="list-style-type: none"> <li>• Collaboration / Partnership which means sharing of information, processes and resources.</li> <li>• Supply Chain Visibility / Transparency.</li> <li>• Strategies – Outsourcing.</li> </ul> <p>V) Intelligence (IT &amp; Architectures). IT and logistics must be integrated to form the smart supply chain. The IT system can be:</p> <ul style="list-style-type: none"> <li>• Terminal oriented – management of the internal operations from the gate to the shunting area.</li> <li>• Intermodal network oriented – terminal to terminal communication (loading list) and management of the wagon fleet (maintenance, corridor allocation, positioning). Intermodal transport agencies operate different information systems.</li> <li>• Rail supply oriented – intermodal operator and railway.</li> <li>• Integrated with the intermodal transport chain – physical, administrative and documentary information about the train.</li> </ul> <p><u>Project website</u></p> <p><a href="http://www.eutp.org">www.eutp.org</a></p>			
<b>FORMAT</b>	Fully Optimised Road Maintenance	EU	Infrastructure construction and maintenance – road
<p><u>Project contact</u></p> <p><a href="mailto:p.h.a.hoogweg@dww.rws.minvenw.nl">p.h.a.hoogweg@dww.rws.minvenw.nl</a></p>			

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<b>GALILEAN</b>	GALILEO Application Network	EU	European intelligent infrastructure
<p><u>Key findings</u></p> <p>The results of the working groups were continuously merged into one strategy paper – the Roadmap Document, which comprises an analysis of the issues identified and a related set of proposed actions. The document intends to draw the attention of the European institutions to critical elements, in order to foster the growth of the European GNSS application industry. Political and institutional issues, business-related issues, as well as technological topics are addressed. In particular, the dependence of the further development of the application industry on the political and institutional environment is discussed in depth. Some technical aspects making an impact on the commercial success of the downstream sector are also analysed.</p> <p>During the 3 years of the GALILEAN project, the gathering and analysis of European industry's views has resulted in a proposed action plan. Summarising the industry experts' recommendations, the following main areas for action can be identified:</p> <ul style="list-style-type: none"> <li>• Integration of GNSS and other radio navigation means into a coherent European Radio Navigation Policy, ensuring a reliable and robust positioning service for Europe.</li> <li>• Agreed approach for the Public Regulated Service (PRS) for specific civil or military user groups, in particular with a view of the future military GPS service.</li> <li>• Better consultation with industry at political/institutional level, especially on issues potentially having an impact on future GNSS business development (intellectual property rights, agreements with third countries, policy on receiver royalties, etc.).</li> <li>• Review of GALILEO programme planning in terms of schedule and cost to increase its credibility. Specifically, the impact of the Public Regulated Service (PRS) has to be taken into account.</li> <li>• The GALILEO signal definition, i.e. the Interface Control Document (ICD), for the open services has to be made available as a basis for any further technical development.</li> <li>• Coordinated Research and Development activities at national and European level addressing the relevant key areas. The SME access to these programmes has to be facilitated.</li> <li>• Proposed actions involve either the EU Member States, the European institutions, or the GALILEO programme management.</li> </ul> <p><u>Policy implications</u></p> <p>In the political category, the issues are related to integrating the GALILEO initiative and other GNSS systems into a coherent European Radio Navigation Policy, thus ensuring a reliable and robust positioning service for Europe. The implementation of the Public Regulated Service for specific civil or military user groups has to be prepared, in particular with a view to the future military GPS service. In consequence, the actions which should be taken on this level are focused on the establishment of a clear and positive political and institutional environment to enable optimal development of the application industry. Specifically, the relations with non-European countries have to be carefully considered.</p> <p><u>Project website</u></p> <p><a href="http://www.galilean-network.org">www.galilean-network.org</a></p>			
<b>GEMINUS</b>	Galileo European Multimodal Integrated Navigation User Service – Galileo Service Definition	EU	European intelligent infrastructure
<p><u>Project website (or contact)</u></p> <p>none</p>			

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<b>IASON</b>	Integrated Assessment of Spatial Economic and Network Effects of Transport Investments and Policies	EU	Development of the trans-European transport network
<p><u>Key findings</u></p> <p>With regard to overall economic impact of transport projects and policies, it can be said that socio-economic macro trends have a much stronger impact on regional development than transport policies. If one considers that under normal economic circumstances the long-term growth of regional economies is in the range between two and three percent per year, and additional regional economic growth or less than one or two percent as is observed in Western Europe over twenty years can be considered small. With respect to indirect effects per se, there is no evidence that transport infrastructure investment is uniquely or exceptionally highly productive. The additional benefit to the economy which is supplementary to the benefits in the transport system is an order of magnitude lower than the travel cost improvements. For specific regions, however, benefits to the economy can be of the same order of magnitude as the monetized accessibility improvements. Performing a high quality but conventional transport CBA, therefore, in some instances will only give a limited account of the full benefits for these regions. Speeding up the TEN-T programme has an effect on GDP which is relatively small. The test with the different models indicate that the TENs have relatively strong distributive effects to the economy, affecting in particular the East-West growth balance and stimulating the rate of cohesion. High-speed rail projects seem to be more effective in terms of promoting regional economic activity than conventional rail projects, and rail projects seem to be more effective than road projects. All transport pricing scenarios have negative economic effects but these can be mitigated by their combination with network scenarios with positive economic effects, although the net effect depends on the magnitude of the two components. The network scenarios in general reduce disparities in accessibility, but reduce disparities in GDP per capita only if also the TINA projects are implemented. Pricing policies are not favourable for the poorer regions. Concerning the linkage between accessibility and economic growth, it was found that the increases in regional accessibility from TENs policy translate into relatively small increases in regional economic activity. For regions in the European core with all the benefits of a central geographical location plus and already highly developed transport and telecommunications infrastructure, additional gains in accessibility through even larger airports or even more motorways or high-speed rail lines may will bring only little additional incentives for economic growth. For regions at the European periphery or in the accession countries, however, which suffer from the remote geographical location plus an underdeveloped transport infrastructure, a gain in accessibility through a new motorway or rail line may bring significant progress in economic development. But, to make things even more complex, also the opposite may happen if the new connection opens a formerly isolated region to the competition of more efficient or cheaper suppliers in other regions. The linkage of a transport model with a regional economic or macro economic model combines the benefits of a transport model, which has a detailed underlying network, with the benefits of a model, which measures the economic effect of changes in transport patterns to economic sectors and captures the effects of various investment strategies.</p> <p><u>Policy implications</u></p> <p>The state of the art of appraisal of transport projects and policies is developing rapidly. However, the TEN-T projects and in particular the opening of Europe to the East poses formidable challenges for transport appraisal. Better transport infrastructure will link together places with quite different labour markets, standards of living and access to goods and services. For major projects and policies, a good quality transport sector cost-benefit analysis is vital. This requires adequate data and modelling of the transport networks to generate the inputs to the analysis. A wider</p>			

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<p>economy model linked to a transportation model does offer a way forward in modelling the total effect, including the economic network effects. The outputs of such models include forecast changes in GDP, employment by region and consumer surplus. Conceptually such models generate the total economy-wide benefit of a project or policy.</p> <p>An appraisal that is consistent in its treatment of effects from both national and supranational perspective is capable of dealing with cross-border effects. The choice of scale and models is important to highlight these effects.</p> <p>The project has made available a new set of interconnected instruments that now can be used to assess the spatial and economic consequences of transport policies. Besides producing broad pictures of the overall economic impact for the EU, the function of the models is in particular to point the attention of policy makers to those regions, sectors or policy packages where the indirect impacts of infrastructure and pricing policies are above average. While the wider economic impacts can be substantial as transport impacts propagate over time through the economy, these are not necessarily always welfare effects that are additional to the transport impacts. When they are, they can be of significant magnitude, and these cases cannot be uncovered by models like CGEurope and E3ME, when linked to the appropriate transport modelling tools.</p> <p><u>Project website</u> <a href="http://www.wt.tno.nl/iason">www.wt.tno.nl/iason</a></p>			
<b>INDICATORS</b>	TEN-T Performance Indicators	EU	Development of the trans-European transport network
<p><u>Key findings</u></p> <p>The main result of the project was the development of 28 priority indicators for the TEN-T (all transport modes) to measure progress with respect to the eight policy goals listed above.</p> <p>Other key results are as follows:</p> <p>The current infrastructure reporting mechanism to report on the status of the TEN-T network forms the starting point for development of a full-scale monitoring mechanism. Basic infrastructure data, currently collected, through biannual surveys of Member States can be expanded to include data required for the estimation of Performance indicators required for a better picture and assessment of the TEN-T and the degree of achievement of trans-European objectives and priorities. The use of performance indicators would provide needed depth to assess investment priorities and gaps in the network. There is a need for a consistent reporting and monitoring mechanism for the TEN-T.</p> <p>The project confirmed that collecting and maintaining data to support performance-based planning programmes in Europe is a critical obstacle. The vast majority of national transport authorities surveyed indicated that their data collection resources are limited. In the area of freight movements, these constraints are even more apparent. Freight shipments are more varied in content, and vary more over time, than passenger movements, so accurate data collection is a complex, costly process. Co-operation from the private sector or operators in various modes is sometimes limited due in part to concerns about competitiveness and security reasons.</p> <p>Key issues facing Candidate Countries for Accession include the environment, financing of the transport sector, recent organisational restructuring of the transport sectors (especially the railways) and the rapidly decreasing modal share of environmentally friendly modes of transport. The restructuring of the transport sectors in most Candidate Countries for Accession seems to lag behind the development of the transport sector in EU countries. Thus, these countries have an even greater need for a more precise definition of transport networks and performance targets at the short- and long-term scales so that scarce funding should be used as efficiently as possible.</p> <p>In the short-term, infrastructure investments to extend and improve the quality of the networks in the</p>			

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<p>Accession Countries are a key priority. Total investment needed to maintain and develop the transport system infrastructure to EU standards is at least €90 billion. More than half of the amount foreseen for road networks, and around €30 billion for the rail network. In the longer term, the Commission has estimated that €258 billion would be needed to enhance transport networks to acceptable standards.</p> <p><u>Policy implications</u></p> <p>Development of performance indicators is not a single 'snapshot' exercise. The European Commission should adopt plans for the continuous update, refinement, and development of performance indicators. Regular updates of the indicators coupled with the development of more intricate and sophisticated levels of performance indicators, as data availability (particularly among Candidate Countries) improves, should be a priority. As the European policies and guidelines evolve and with the proposal of a major revision of the guidelines by 2004, the emphasis would be more in adopting intricate performance indicators to provide support. The importance of continuing close co-operation between European entities and organisations (in particular DG TREN and Eurostat), and Member States and Candidate Countries should be emphasised.</p> <p>On the basis of the project findings, the following steps are envisioned as a follow-up or a road map to apply and implement a consistent and harmonised trans-European monitoring framework:</p> <ul style="list-style-type: none"> <li>• Data collection and standardisation: Minimum quality levels should be defined for the actual collection of the data in order to make data reliable and comparable. Definition of the quality of data-collection for the various indicators fell outside the scope of this project but needs serious attention. In cases where national authorities differ in the interpretation and estimation of performance indicators, despite the existence of available data, efforts should be made by international organisations and/or Eurostat to achieve a degree of standardisation in the development and estimation of indicators.</li> <li>• Pilot survey of TEN-T applying the performance indicators and supporting data: National authorities should carefully review the identified lists of indicators and provide a critical assessment on the time period for adoption and use of each indicator in question. A pilot survey to collect the data on the TEN-T is necessary for the estimation and validation of the recommended performance indicators. Short-term indicators with high data availability can be the basis for the pilot surveys. The pilot survey could perhaps focus on a selected group of high-priority international corridors, according to certain criteria.</li> <li>• Specification of concrete target statements for Trans-European Transport policy: The lack of specific target statements related to the current TEN-T Guidelines can be a source of vagueness and non-specificity of performance measures to measure the degree of relevance of investments and projects to the trans-European policies. The development of specific target statements and objectives entails extensive consensus-reaching activities of the Commission with the Member States. This is necessary in order to provide clarity and substance to the general objectives, and to facilitate a consistent approach to meeting them.</li> <li>• Refinement and development of the performance indicators framework: On the basis of the above work, the framework developed in the INDICATORS study can be fine-tuned and updated to reflect the current status of priorities (through target statements) and data availability (through the pilot survey) for adoption as TEN-T reporting framework within the short-term. International and European organisations such as Eurostat, OECD, UN/ECE, PIARC, ECMT and UIC should be closely involved in the harmonisation work, in co-ordination with current data collection activities which take place under their auspices.</li> <li>• Inclusion of the performance indicators monitoring mechanism within the revision of the TEN-T guidelines.</li> </ul> <p><u>Project contact</u></p>			

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Key findings / Policy implications / Project website or contact			
<a href="mailto:a.winder@isis.tm.fr">a.winder@isis.tm.fr</a>			
<b>INTERMODA</b>	Integrated solutions for intermodal transport between the EU and the CEECs	EU	Development of the trans-European transport network
<p><u>Key findings</u></p> <p>Identification of a Pan-European intermodal transport network, specification of technical performance indicators, market determinants and parameters for regulatory framework conditions, analysis and assessment of status quo and forecast on future demand (horizon 2015).</p> <p><u>Policy implications</u></p> <p>Intermodal transport is one of the key topics in current European transport policy. One of the principal measures identified by the European Commission is to turn intermodality into reality and make it really competitive with road transport.</p> <p>This goes together with the aim to revitalise the railways and promote the use of short-sea shipping ('sea motorways') and inland waterway transport.</p> <p>This should contribute to an optimal integration of different modes so as to enable a more efficient and sustainable use of the transport system.</p> <p>INTERMODA contributes to this objective as it comprises an important step in the development of an effective transport system, enabled through the identification of measures which collectively will improve the intermodal network between the EU and the CEECs and thereby facilitate economic growth.</p> <p><u>Project website</u></p> <p><a href="http://www.intermoda.org">www.intermoda.org</a></p>			
<b>INWANET</b>	Workshop on integration of EU CEECs Inland Waterway	EU	Development of the trans-European transport network
<p><u>Project website (or contact)</u></p> <p>none</p>			
<b>ITIP</b>	Innovative Technologies for Intermodal Transfer Points	EU	Interconnection of multi-modal networks for freight
<p><u>Project website</u></p> <p><a href="http://www.eutp.org/en/itip/">www.eutp.org/en/itip/</a></p>			
<b>LEONARDO</b>	Linking Existing On-ground, Arrival and Departure Operations	EU	Passenger interchanges
<p><u>Key findings</u></p> <p>The three LEONARDO experiments demonstrate the benefits sensed before the beginning of the project. The results will serve the airport authority, airline and ATC community to define better ways for airport operations.</p> <p>There has been an improvement on the efficiency of the main airport operation events:</p> <ul style="list-style-type: none"> <li>• Improvement of the Arrival Prediction (in-block event). Predictability has been improved. In addition, with the system there is no need to have people mentally estimating in-block times;</li> <li>• the turn-around process; and</li> <li>• departure prediction.</li> </ul> <p>One final message derived from the result is that the Collaborative Decision Making (CDM) process allows</p>			

Theme: Infrastructure Provision (including TENS)			Last update: 13 August 2006
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
<p>that individual planning improvements have a network effect to the other actors and contribute to the overall efficiency improvement, due the common situation awareness: A better estimation of the in block time will contribute to a better estimation of the off-block time. The improvements are spread along the whole process. Having more precise estimates of the airport operation events leaves more time available to re-plan resources. As shadow mode techniques have not allowed interfering the real operations, this has not been possible to test directly this benefit.</p> <p>In conclusion, simple solutions as the ones proposed by LEONARDO, which includes the integration of the existing planning processes of the individual actors and the exchange of information can bring great benefits. There is room for improvement on the existing procedures.</p> <p>LEONARDO has provided the basis for a standard for an Integrated Model of Airport Traffic Management Tools at European level and gives evidence of applying CDM concept at the airport operation management level. Further research is needed, but results confirm that we are in the right direction. It should be kept in mind that CDM is first a philosophy where every actor should be focussed on the overall system efficiency. Then, practically CDM should be broken down into processes and a tool set even if the processes should drive the tools implementation.</p> <p><u>Policy implications</u></p> <ul style="list-style-type: none"> <li>• Necessity of a common terminology: sharing a Common Terminology at the European level among all the stakeholders;</li> <li>• LEONARDO has only involved one airline per airport for the trials; time should be dedicated to explore the need to involve other airlines in the CDM processes defined and which benefits could be obtained;</li> <li>• the CDM concepts could be further detailed when exposed to more controllers;</li> <li>• the Airport CDM information system should not anymore consist on developing another integration solution but providing a flexible and reliable integration layer;</li> <li>• the integration layer should acts as a Hub System which centralises and consolidates all the information exchanges;</li> <li>• waiting at the stand, rather than at the runway, in those situations where traffic demands exceeds the capacity of the departure runway, would make possible a better estimation of the taxi time and thus would increase the accuracy of the take-off time (MTOT). In addition, this would provide gains in terms of fuel saving;</li> <li>• bounds on warm-up periods are given to airlines, being often exceeded by pilots; and</li> <li>• airlines should be given an opportunity to prioritise certain aircraft in the take-off sequence.</li> <li>• In conclusion, it is highly recommended to work on the optimisation of the start-up procedure for normal and critical conditions (i.e. airport congested) and on the inclusion of airline priorities in the arrival and departure sequences. A more in depth analysis is needed.</li> </ul> <p><u>Project contact</u> <a href="mailto:jmdepablo@aena.es">jmdepablo@aena.es</a></p>			
<b>OPAL</b>	Optimisation Platform for Airports, including Land-slide	EU	Passenger interchanges
<p><u>Project contact</u> <a href="mailto:eenige@nlr.nl">eenige@nlr.nl</a></p>			
<b>PISTA</b>	Pilot on Interoperable Systems for Tolling Applications	EU	European intelligent infrastructure
<p><u>Project website Project contact</u> <a href="http://www.pistaproject.com">www.pistaproject.com</a></p>			

Theme: Infrastructure Provision (including TENs)			Last update: 13 August 2006
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
<b>POLARIS</b>	Detailed Service Analysis (Galileo). Subtask 2: User Tools	EU	European intelligent infrastructure
<u>Project contact</u> <a href="mailto:mromay@gmv.es">mromay@gmv.es</a>			
<b>PROMAIN</b>	Progress in European maintenance and management of railway infrastructure	EU	Infrastructure construction and maintenance – rail
<u>Key findings</u> The Thematic Network has managed to enhance the performance of railway infrastructure through the application of innovative knowledge, tools and methodologies. The project has achieved to: <ul style="list-style-type: none"> <li>• establish co-operation between users and parties who can provide solutions;</li> <li>• make available the results of research and technological developments;</li> <li>• investigate and apply better construction principles, management and safety approaches;</li> <li>• identify needs for further actions in Europe relevant to railways and technological development;</li> <li>• collect and disseminate knowledge about highly performant slab tracks and study these systems' advantages and disadvantages.</li> </ul>			
<u>Policy implications</u> ProMain is technically oriented and was designed to enhance the performance of the railway infrastructure in maintenance and management. EU policies involvement has two facets: policy implementation (ProMain defines and solves tasks which have a considerable impact on the realisation of EU policies) and policy initiatives (ProMain contributes to the development of policies in statu nascendi and makes proposals for new railway policies on its own). For the implementation of EU policies the ProMain approach took into consideration the 3 major basic policy principles: single market, sustainable mobility and the EU enlargement. With regard to the latter, application areas have been sought for all classes of Trans-European railway networks. All tasks that have been carried out within the project envisage the preparation of a field for future R & D activities which as such is itself a contribution to policy initiation.			
<u>Project website</u> <a href="http://www.promain.org">www.promain.org</a>			
<b>RAIL</b>	Reliability Centred Maintenance (RCM) Approach for the Infrastructure and Logistics of Railway Operation	EU	Infrastructure construction and maintenance – rail
<u>Project website</u> <a href="http://laurel.datsi.fi.upm.es/~rail/">laurel.datsi.fi.upm.es/~rail/</a>			
<b>SAMARIS</b>	Sustainable and Advanced Materials for Road Infrastructure	EU	Infrastructure construction and maintenance – road
<u>Project website</u> <a href="http://samaris.zag.si">samaris.zag.si</a>			

Theme: Infrastructure Provision (including TENS)			Last update: 13 August 2006
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
<b>SPIN-HSV</b>	Shipping quality and Safety of high-speed vessels, terminals and Ports operations in Nodal points	EU	Interconnection of multi-modal networks for freight
<u>Project website</u> <a href="http://www.marinetech.co.uk/project_details/SPIN/home.htm">www.marinetech.co.uk/project_details/SPIN/home.htm</a>			
<b>TRAPIST</b>	Tools and Routines to Assist Ports and Improve Shipping	EU	Interconnection of multi-modal networks for freight
<u>Project website (or contact)</u> none			
<b>UG198B</b>	Public transport interchange	UK	Passenger interchanges
<u>Project website</u> <a href="http://www.rmd.dft.gov.uk/project.asp?intProjectID=9274">www.rmd.dft.gov.uk/project.asp?intProjectID=9274</a>			
<b>UG413</b>	National road condition survey	UK	Infrastructure construction and maintenance – road
<u>Project website</u> <a href="http://www.rmd.dft.gov.uk/project.asp?intProjectID=9372">www.rmd.dft.gov.uk/project.asp?intProjectID=9372</a>			
<b>Y201376</b>	Achieving best value through pavement maintenance monitoring	UK	Infrastructure construction and maintenance – road
<u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=877">www.ha-research.co.uk/projects/index.php?id=877</a>			
–	Architecture of railway stations in Italy	IT	Infrastructure construction and maintenance – rail
<u>Project contact</u> <a href="mailto:ezio.godoli@unifi.it">ezio.godoli@unifi.it</a>			
–	Chalk hydrogeology and flood protection	UK	Infrastructure construction and maintenance – road
<u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=843">www.ha-research.co.uk/projects/index.php?id=843</a>			
–	Consolidation of Whole Life Value of Highway Surfacing	UK	Infrastructure construction and maintenance – road
<u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=998">www.ha-research.co.uk/projects/index.php?id=998</a>			
–	Definitive Vehicle Wear Evaluation	UK	Infrastructure construction and maintenance – road
<u>Project website</u>			

Theme: Infrastructure Provision (including TENs)			Last update: 13 August 2006
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
<a href="http://www.ha-research.co.uk/projects/index.php?id=471">www.ha-research.co.uk/projects/index.php?id=471</a>			
–	Durability Of Concrete Pavements Surfaced With Thin Asphalt	UK	Infrastructure construction and maintenance – road
<u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=733">www.ha-research.co.uk/projects/index.php?id=733</a>			
–	Durability of Quieter Surfacing	UK	Infrastructure construction and maintenance – road
<u>Project website</u> <a href="http://www.ha-research.gov.uk/projects/index.php?id=653">www.ha-research.gov.uk/projects/index.php?id=653</a>			
–	Efficient terminals for intermodal transport	SE	Interconnection of multi-modal networks for freight
<u>Project website</u> <a href="mailto:peter.grundevik@sspa.se">peter.grundevik@sspa.se</a>			
–	Element and system risk considerations in bridge management	UK	Infrastructure construction and maintenance – road
<u>Project website</u> <a href="http://www.ha-research.gov.uk/projects/index.php?id=665">www.ha-research.gov.uk/projects/index.php?id=665</a>			
–	Freight Interchange Location Study - Phase 2	UK	Interconnection of multi-modal networks for freight
<u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=558">www.ha-research.co.uk/projects/index.php?id=558</a>			
–	Improved Risk Assessment for Surface Condition	UK	Infrastructure construction and maintenance – road
<u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=860">www.ha-research.co.uk/projects/index.php?id=860</a>			
–	Improving the stiffness of existing railway track	UK	Infrastructure construction and maintenance – rail
<u>Project contact</u> None			
–	Integration of Whole Life Costing of Road Features	UK	Infrastructure construction and maintenance – road
<u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=625">www.ha-research.co.uk/projects/index.php?id=625</a>			
–	Maintenance of Footways and Cycleways	UK	Infrastructure construction and maintenance – road
<u>Project website</u>			

Theme: Infrastructure Provision (including TENs)			Last update: 13 August 2006
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
<a href="http://www.ha-research.co.uk/projects/index.php?id=626">www.ha-research.co.uk/projects/index.php?id=626</a>			
–	Maintenance techniques to minimise traffic disruption	UK	Infrastructure construction and maintenance – road
<u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=121">www.ha-research.co.uk/projects/index.php?id=121</a>			
–	Methodology and proposal of new road categorization according to regions in Slovenia	SI	Infrastructure construction and maintenance – road
<u>Key findings</u> <p>This study analysed in detail the present road management and the possible creation of 3, 8, 12 or 14 regions in Slovenia. As a part of this analysis, those regional roads that could be classified in higher categories according to the spatial development strategy of Slovenia, have been defined. Although there are no direct results related to infrastructure provision, the study is relevant in terms of who manages the road infrastructure. It was envisaged in the study that 30% to 36% of the existing state road network would remain within central state control.</p>			
<u>Policy implications</u> <p>The main purpose of this study was to define different possible alternative numbers of regions in Slovenia as well as elaboration of consequences of this process for the state road network. More detailed implementation of competences, a list of the state road network that could be transferred to regions, categorisation of the transferred roads and categorisation of all other roads that would remain under the jurisdiction of the DRSC (Directorate for Roads of the Republic of Slovenia), can be done only after final adoption of the number of regions in Slovenia.</p>			
<u>Project contact</u> <a href="mailto:jure.miljevic@omegaconsult.si">jure.miljevic@omegaconsult.si</a>			
–	Nenagh Bypass – Noise aspects	IE	Infrastructure construction and maintenance – road
<u>Key findings</u> <p>Noise measurements made on the (former) N7 road through Nenagh indicated a significant reduction in noise levels in the town after the opening of the bypass in the year 2000. The most significant reduction was between the hours of 04:00 and 07:00 on weekdays: this appears to be due to the early morning heavy commercial vehicles on the Dublin-Limerick route.</p>			
<u>Policy implications</u> <p>None</p>			
<u>Project contact</u> <a href="mailto:vomalley@nra.ie">vomalley@nra.ie</a>			
–	New Designs for Sustainable Long Life Roads	UK	Infrastructure construction and maintenance – road
<u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=479">www.ha-research.co.uk/projects/index.php?id=479</a>			

Theme: Infrastructure Provision (including TENs)			Last update: 13 August 2006
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
–	New materials for sustainable long life roads	UK	Infrastructure construction and maintenance – road
<u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=480">www.ha-research.co.uk/projects/index.php?id=480</a>			
–	Optimal sizing of container terminal and fare efficiency	IT	Interconnection of multi-modal networks for freight
<u>Project website</u> <a href="http://cofin.cineca.it">cofin.cineca.it</a>			
–	Optimisation of road design as function of driver behaviour	IT	Infrastructure construction and maintenance – road
<u>Project contact</u> <a href="mailto:benc@uniroma3.it">benc@uniroma3.it</a>			
–	Optimising the returns from long life roads	UK	Infrastructure construction and maintenance – road
<u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=510">www.ha-research.co.uk/projects/index.php?id=510</a>			
–	Pavement whole life costing for new roads	UK	Infrastructure construction and maintenance – road
<u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=472">www.ha-research.co.uk/projects/index.php?id=472</a>			
–	Prevention and removal of ice and snow on roads	UK	Infrastructure construction and maintenance – road
<u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=125">www.ha-research.co.uk/projects/index.php?id=125</a>			
–	Quieter concrete roads	UK	Infrastructure construction and maintenance – road
<u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=354">www.ha-research.co.uk/projects/index.php?id=354</a>			
–	Rapid construction of passenger interchanges	UK	Passenger interchanges
<u>Key findings</u> <p>The objectives of this Infrastructure provision theme research project were to:</p> <ul style="list-style-type: none"> <li>investigate generic design issues for new interchanges;</li> <li>develop design brief for a good quality small passenger interchanges; and</li> <li>produce 'Package Design' for a quickly-built station.</li> </ul> <p>In particular the project complies with the Infrastructure provision sub themes of road infrastructure maintenance, especially, identifying new management solutions for cost effective infrastructure in road</p>			

Theme: Infrastructure Provision (including TENS)			Last update: 13 August 2006
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
<p>transport; rail infrastructure construction and maintenance; passenger interchanges, especially good practice in planning, financing and operating passenger interchanges.</p> <p>For the project, detailed drawings of the prototype design have been produced and augmenting the design drawings, are two costing models, one for a platform and canopy, and one for bridge construction developed by Davis Langdon and Everest. In particular the project has:</p> <ul style="list-style-type: none"> <li>• Pinpointed effective means of shaping the stations' physical environment to ensure safety and deter vandalism and trespassing;</li> <li>• Determined the size of 'small interchanges' as varying from a bus-shelter size to a suburban interchange – falling under the railway station categories D, E, F, (and G of the new SRA-proposed categorisation);</li> <li>• Identified key cost-factors and expenditure percentages incurred at each activity of a typical Greenfield station build, using Davis Langdon and Everest's extensive database on station costs.</li> <li>• Created a Brief for a Good Quality Small Passenger Interchange, to serve as a basis for the design of modular components to be developed in the subsequent design phase of the project. The Brief provided general principles of interchange design, explained the advantages of 'rapid construction' and presented the functional, architectural and engineering principles for the design of small interchanges. It also identified generic products for the design of new modular interchanges;</li> <li>• In delivering the final research objective, production of a 'Package Design' for a quickly-built station, this research progressed to the design of the generic products including Platform Sub-structure, Platform and Canopy and Bridge.</li> </ul> <p><u>Policy implications</u></p> <ul style="list-style-type: none"> <li>• Conducting the majority of the work offsite, thus removing the dangers and costs associated with working near live railways, would allow the introduction of a manufacturing approach to the design and assembly. Construction activities at site would be restricted to site preparation and installation of foundations.</li> <li>• Assembly of the station platforms, ancillary shelters and over-bridges may then be achieved in a single weekend.</li> <li>• Similar techniques could also be applied to the construction of passenger interchanges for bus, tram and light rail systems.</li> </ul> <p><u>Project contact</u> <a href="mailto:ers@dft.gov.uk">ers@dft.gov.uk</a></p>			
–	Roadworks signs at night	UK	Infrastructure construction and maintenance – road
<p><u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=127">www.ha-research.co.uk/projects/index.php?id=127</a></p>			
–	Total energy input into road construction	UK	Infrastructure construction and maintenance – road
<p><u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=311">www.ha-research.co.uk/projects/index.php?id=311</a></p>			
–	Use of concrete pavements for motorway widening and strengthening	UK	Infrastructure construction and maintenance – road
<p><u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=124">www.ha-research.co.uk/projects/index.php?id=124</a></p>			

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Key findings / Policy implications / Project website or contact			
–	Wear effects of traffic – dynamic effects	UK	Infrastructure construction and maintenance – road
	<u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=232">www.ha-research.co.uk/projects/index.php?id=232</a>		
–	Whole life cost model for maintenance	UK	Infrastructure construction and maintenance – road
	<u>Project website</u> <a href="http://www.ha-research.co.uk/projects/index.php?id=224">www.ha-research.co.uk/projects/index.php?id=224</a>		

# Annex II: General information on the Transport Research Knowledge Centre and analysis process used

## The Knowledge Centre's background

The EXTR@Web project – Exploitation of Transport Research Results via the Web – attempts to collect, structure, analyse and disseminate transport research results, covering not only EU supported but also nationally financed research in the European Research Area (ERA), as well as selected global transport RTD programmes and projects.

The EXTR@Web consortium has brought together eight main contractors to combine strong and in-depth technical knowledge of transport technology and of EU and national transport RTD programmes with solid communication and dissemination experience.

The current project's direct predecessor, EXTRA (a Fourth Framework Programme Transport RTD project), co-ordinated dissemination activities on the European level for the first time. While FP4 addressed transport research on a mode-by-mode basis, the current Fifth Framework Programme (FP5) focuses on generic themes that consequently reflect transport policy objectives.

The EXTR@Web project will provide support to research at European and national levels by building up and promoting an electronic hub. The key objectives are:

- To establish a comprehensive web-based Knowledge Centre, providing structured and timely access to both detailed and user-oriented summary information on transport research programmes and their results across Europe;
- to provide an electronic hub for inter-connecting European and national programmes and individual networks concerned with transport research into an easily navigable European network;
- to establish a common best practice scheme for the structure and content of the reporting of transport research results;
- to provide high-quality analytical outputs that are structured and tailored according to the type of stakeholder and medium; and
- to raise awareness of the new service, the implications of emerging results, and the wider opportunities under national research programmes across Europe as a whole.

EXTR@Web will provide a comprehensive pool of programme, project and results related information to users, principally in electronic format via the Internet. The approach is based on three main strokes of work covering:

- Monitoring, analysis and information preparation;
- website and electronic news service, the principal dissemination channels; and
- management of knowledge transfer, including dissemination by non-electronic means, and also the maintenance of a contact database and e-mail enquiry service and evaluation of the performance of EXTR@Web.

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## Definition of transport research

For inclusion into the Transport Research Knowledge Centre, Transport research programmes and projects have to be within the definition of research and transport simultaneously. This will define the eligibility of projects.

### Definition of research

General OECD definition:

"Creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of humanity, culture and society, and the use of this stock of knowledge to devise new applications."

Additional transport research criteria:

- Targeted – in line with transport policy aims, strategies and processes to solve the inherent problems for society.
- Accessible – a public activity, open to scrutiny by peers.
- Transferable – useful beyond the specific research project, applicable in principle to other researchers and research contexts as well as decision-makers in policy, industry and science.

### Definition of transport

In order to clarify expectations from the Transport Research Knowledge Centre, and to ensure a common understanding of important terms, the Programme Analysis Group of EXTR@Web has come up with the following definition of transport.

- Transport is the means by which a person or material of any kind is passed from its origin to its destination.
- Transport comprises:
  - the transport users: passenger, business, freight;
  - the transport vehicles (full life cycle issues);
  - the transport infrastructure (full life cycle issues);
  - the transport system: the interaction of users, vehicles and infrastructure;
  - the impacts of transport: contribution to objectives, and hence to overall sustainability; and
  - the transport tools: methods and instruments to help ensure an effective contribution to the objectives.

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## Three levels of analysis

### Project level analysis

For European, national and international projects the following harmonized process was agreed:

- For each eligible project, the project co-ordinator will be requested to draft a Project Profile;
- the EXTR@Web consortium identifies, for each project all relevant themes (typically up to five), and provides the project linkage;
- for each eligible project, the project co-ordinator will be requested to draft the other elements of the reporting scheme – Progress Summary and Result Summary – due to the project progress and provides the final report;
- projects with highest relevance and best available final results will be selected for analysis;
- for every such relevant theme within each project a short and concise paragraph – structured with bullet points as appropriate – will be written to present the key findings of the project in relation to the objectives of the theme; and
- this information will be searchable on the Knowledge Centre website.

### Thematic analysis

The thematic analysis has been exploiting existing project level analysis. The consolidated project wise findings have been structured and analysed along 30 themes, which are fixed for the project life time and fed into annual Thematic Research Summaries and Annual Compendia. However, for reporting purposes Thematic Research Summaries have been limited to 28 volumes (cf. Chapter 1).

The sequence of outputs has been comprising an explanation of the overall structure, and regular reports treating national, European and international research in a comprehensive way.

Deliverable number	Title	Release date (final version)
D2.A	"Thematic structure and definitions – all themes"	August 2006
D2.B	"European, national and international project database"	July 2006
D2.C	"First annual thematic research summary"; 30 vol.	December 2004
D2.D	"Second annual thematic research summary"; 10 vol.	March 2006
<b>D2.E</b>	<b>"Third annual thematic research summary"; 28 vol.</b>	<b>August 2006</b>

**Table: The sequence of deliverables**

### Policy level analysis

Whilst the 30 themes are fixed, this type of analysis should give the flexibility to provide information on ad hoc policy priorities. Hence, policy level analysis will synthesize key findings of projects across combinations of themes. As an output, policy brochures shall be prepared depending on ad hoc requirements by DG TREN or by the high-level Advisory Group (AG).

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## Annex III: Editorial team for Thematic Research Summaries

Please note that – in principle – all EXTR@Web partners and sub-contractors will be contributing to a particular Thematic Research Summary because all project level findings that are of some relevance to one of the 28 (30) individual themes are presented in the comprehensive format of these papers.

The following summary of authors and peer reviewers is presented in alphabetical order while the main author of this paper is given on page i of the document.

### **Fabien Drevetton**, ISIS; France

Mr Drevetton has an electrical engineering post-MSc degree, an MBA and over 8 years experience in Intelligent Transport Systems for road transport. He has been a senior engineer with ISIS since 2001, specialising in traffic control, motorway management, ITS standards development process and system architecture.

*Co-author: Road Transport*

### **Prof J Augusto Felício**, Neptune – CEGE/ISEG; Portugal

Professor Felício, holding a PhD in management, is teaching graduate and post-graduate courses such as 'Maritime transport and port management' and 'Land transport and logistic management' at ISEG, School of Economics and Management (Technical University of Lisbon). His activities include participation in transport research where he has published several related articles and books.

*Main author: Waterborne Transport, Intelligent Transport Systems*

*Peer review: Efficiency, Vehicle Technology*

### **Dr Paul E Firmin**, Institute for Transport Studies, University of Leeds (ITS); UK

Dr Firmin has 30 years of experience in transport planning and engineering, including local authority, consultancy and academia. His research specialities are: traffic management, transport survey design & analysis, traveller information systems; driver route choice behaviour and transport telematics. He is currently the MSc(Eng) degree programme leader and international student adviser at ITS, University of Leeds. He teaches computing skills and traffic management, and supervises student dissertation projects.

*Main author: Information and Awareness*

*Peer review: Safety and Security*

### **Dr Nils Gendner**, Neptune – University of Bremen, ISL; Germany

Dr Gendner has been working for more than four years at the University of Bremen, Institute of Shipping Economics and Logistics. His main topics include the analysis of processes, functions and data flows in shipping and within the rail sector. He contributes to ongoing efforts in intermodality by participating in several projects dealing with intermodal concepts and developments.

*Main author: Intermodal Transport, Integration*

*Peer review: Financing Tools, Pricing and Taxation*

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**Wolfgang Helmreich**, Industriebetriebe-Betriebsgesellschaft mbH (IABG); Germany  
Mr Helmreich is a civil engineer from the Technical University of Munich. He has more than 15 years experience with transport planning and infrastructure design in the rail, road and air sector, and sound knowledge of vehicle technologies. His expertise also includes project management, web publishing and dissemination skills. He joined IABG in 1999 as a senior transport consultant after working as project manager at several German engineering companies. He is principal editor of all Thematic Research Summaries.

*Main author: Air Transport, User Aspects, Safety and Security*

*Peer review: Regional Transport, Rail Transport, Waterborne Transport, Environmental Aspects, Land Use Planning*

**Cristina Ivan**, Group of Independent Experts Ltd (GIE); Romania

Ms Ivan has a law degree and has graduated a Master course in project management. Ever since 1998 she has participated in various projects financed by international donors in Romania. The main areas of her expertise cover: project management, legal approximation of the EU acquis & drafting of environmental legislation, as well as the carrying out of awareness raising and dissemination activities, including those for the transport sector.

*Main author: EU Accession Issues*

*Peer review: Economic Aspects, User Aspects, Transport Management*

**Dr Ann Jopson**, Institute for Transport Studies, University of Leeds (ITS); UK

Dr Jopson is a Research Fellow whose main interests and expertise lie in the areas of travel behaviour psychology, transport marketing and urban transport planning and policy, with particular emphasis on travel demand management through attitudinal and behavioural measures. Her PhD thesis was based on the role of psychology in reducing car use.

*Main author: Environmental Aspects*

*Peer review: Rural Transport*

**Dimitris Koryzis**, Systema; Greece

Mr Koryzis is a production & management engineer from the Technical University of Crete and holds an MSc in Decision Sciences from Athens University of Economics & Business. He has more than 8 years experience as technical and managerial consultant for 30 European programmes in the transport sector (road, maritime and intermodal) as well as in research and innovation technology EC projects.

*Co-author: Pricing, Taxation and Financing Tools*

*Peer review: Integration*

**Ulrich Leiss**, Industriebetriebe-Betriebsgesellschaft mbH (IABG); Germany

Mr Leiss is an aerospace engineer from the Technical University of Munich. His professional career includes 24 years experience with research, technical analyses, monitoring and managing national and European projects and programmes. These activities cover the areas aerospace, transport, energy and new technologies.

*Main author: Other Modes, Vehicle Technology*

**Bryan Matthews**, Institute for Transport Studies, University of Leeds (ITS); UK

Mr Matthews has 9 years experience of transport research and project management in both consultancy and university settings. His research expertise is in transport policy analysis and transport economics. He has worked on a number of EU, UK DfT and Research Council projects. He also contributes to teaching activities, lecturing on Air Transport Systems and supervising student projects.

*Main author: Rail Transport*

*Peer review: Air Transport*

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**Prof Anthony D May**, Institute for Transport Studies, University of Leeds (ITS); UK  
 Professor May has over 35 years' experience in transport planning and traffic engineering. He has been a professor at Leeds since 1977, and has served as Head of the Department of Civil Engineering, Dean of the Faculty of Engineering, Pro-Vice Chancellor for Research and Director of the Institute for Transport Studies. He also has practical experience with the MVA consultancy and the GLC in London. His research specialities include: land use planning, traffic management, road pricing, sustainable urban transport, integrated transport and environmental impacts of transport.

*Supervision of entire process of thematic reviews*

**Batool Menaz**, Institute for Transport Studies, University of Leeds (ITS); UK  
 Ms Menaz is a transport economist from the University of Leeds. She has been involved in a number of various projects including research into transport pricing reform issues in air, road and rail for the IMPRINT-Europe thematic network project, and research for the UK Rail Research Centre looking at the alternative visions for the future of the British rail system.

*Main author: Regulation/Deregulation*

*Co-author: Passenger Transport, Equity and Accessibility, Land Use Planning*

*Peer review: Road Transport*

**Christina Paschalidou**, Systema; Greece

Ms Paschalidou is a transportation engineer from Aristotle University (Thessaloniki), with a MSc in Urban and Regional Transport from Laboratory of Transport Economics in Lyon. Her field of interest is transport planning and engineering, EU and national transport policies, sustainability issues and research. She joined Systema in 2005, while her previous experience includes an internship in ISIS, traffic studies elaborated individually and research activities in the Aristotle University.

*Main author: Transport Management*

*Peer review: Information and Awareness*

**Ignacio Rada Cotera**, Neptune – IkerConsulting; Spain

Mr Rada Cotera is a lawyer from Deusto University in Bilbao, holding a diploma and certificate of European studies from Deusto and Saarland Universities, respectively. He has been working on EU projects since 2000. His main expertise is European commercial and regional policy, maritime transport and port affairs, legal aspects of international economic relations, urban planning, regional benchmarking and development.

*Main author: Regional Transport*

**Marco Valerio Salucci**, Università di Roma "La Sapienza", DITS; Italy

Mr Salucci holds a degree in mechanical engineering from the University of Rome "La Sapienza". His past research experience has focused on computer modelling of the operations of freight terminals and automatic passenger transport systems, the latter being carried out within EC funded research projects. His current research for a doctorate is in the area of transshipment and information and communication technologies for intermodal freight transport.

*Co-author: Freight Transport, Urban Transport, Rural Transport, Efficiency, Decision-support Tools*

*Peer review: Intermodal Transport*

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**Dr Karsten Seidel**, Neptune – European Networks and Cooperation; Belgium/Germany  
 Dr Seidel has graduated as economist and holds a PhD from the University of Bremen. He has been working on EU projects since 1988. His main expertise is in European industrial and regional policy, telecommunication research projects, maritime transport and port affairs, evaluation of technical aid, urban planning, regional benchmarking development.

*Co-author: Regional Transport*

**Dr Paolo Delle Site**, Università di Roma "La Sapienza", DITS; Italy  
 Dr Delle Site holds an PhD, and is a senior research fellow at DITS, Transport Area, University of Rome "La Sapienza". He combines professional experience with research activities, the latter mainly being carried out within EC funded research projects. Related activities comprise urban transport planning, urban public transport design, transport project assessment, and policy analysis. His teaching activities include courses in transport planning. Furthermore, he is author of papers in Transportation Research Part A – Policy and Practice and in the European Journal of Transport and Infrastructure Research.

*Co-author: Freight Transport, Urban Transport, Rural Transport, Economic Aspects, Infrastructure Provision, Pricing, Taxation and Financing Tools*

*Peer review: EU Accession Issues, Intelligent Transport Systems, Regulation/Deregulation*

**Damian Stantchev**, Institute for Transport Studies, University of Leeds (ITS); UK  
 Mr Stantchev holds a degree in Economics and Trade from Varna University of Economics in Bulgaria and an MA in Political Science from the Central European University in Hungary. His early research experience was in the area of small business development in transitional economies of Central and Eastern Europe. Damian has also contributed to an extensive report on the role of the logistics and transportation sector in society for the Logistics & Transportation Corporate Citizenship Initiative of the World Economic Forum. His research for a doctorate examines the role of logistics in enhancing the competitiveness of the regional economy and encompasses all aspects of original research and data collection including the design, conduct and analyses of large scale surveys as well as the collection of commercial data and development of case studies.

*Main author: Passenger Transport, Land Use Planning, Equity and Accessibility*

*Peer review: Freight Transport*

**Andrew Winder**, ISIS; France

Mr Winder is a transport planner with a BSc in transport management (Aston University, England) and over 15 years experience in consultancies and public transport authorities covering transport planning and policy, particularly at UK, French and Europe-wide levels. Since 1998 he has been a senior engineer at ISIS, responsible for a wide range of European projects focusing primarily on Trans-European Networks, ITS for road traffic management, urban and regional public transport and EU enlargement aspects.

*Main author: Road Transport*

*Peer review: Passenger Transport, Urban Transport, Other Modes, Equity and Accessibility, Infrastructure Provision*

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**Ard Wolthuis**, Università di Roma "La Sapienza", DITS; Italy

Ard Wolthuis graduated in Science & Innovation Management, in the field of Transport and Mobility, from the University of Utrecht. He has been involved in transport projects and analysed socio-economic, environmental, political and legal aspects, such as the Phileas project, the Fokker bankruptcy, and innovation policy of companies in the Netherlands. Has participated in a European project on innovation in urban public transport systems. Since spring 2005 has joined DITS as a research fellow. His main areas of activities are policy analysis and dissemination of research results.

*Co-author: Efficiency, Decision-support Tools*

**Dr Zhaomin Zhang**, ANAST – University of Liege, Neptune; Belgium

Dr Zhang has got the university degrees of Civil Engineering, Mechanical and Marine Engineering; Master of Transportation Sciences and Doctor of Philosophy. He is a senior engineer and led the important projects related to the "Establishment of a mathematical traffic model on the Belgian waterway network" (Belgian national research program "Transport and mobility"), the project called "On computerisation and management in real-time of operations relating to the exploitation of fluvial traffic to organise the waterway transport", Belgian Regional Ministry of Public Works) and the Project related to the development of a transport cost model in the inland navigation sector. He has also been involved in numerous simulation and operation research activities.

*Peer review: Decision-support Tools*

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