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EXTR@Web Project

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Further information on EXTR@Web's editorial team for Thematic Research Summaries can be obtained from Annex III.

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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)
CEEC	Central and Eastern European Country
DG TREN	EC Directorate-General for Energy and Transport
EC	European Commission
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
PAG	Programme Analysis Group (part of EXTR@Web project)
RTD	Research and Technical Development
TRKC	Transport Research Knowledge Centre; TRKC website at ec.europa.eu/transport/extra

Table of Contents

1. Introduction

This paper provides a structured guide to the results of Research and Technical Development (RTD) projects relating to **Rail Transport**, 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
	4.3	Infrastructure Provision (incl. TENs)
	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 **564** projects deal partly or fully with the issues of **Rail Transport**.

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 **Rail Transport** theme, associated policy issues and the background of project EXTR@Web.

The analysis in this paper is the responsibility of the EXTR@Web project team, and does not 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**

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.

2. Scope of theme

2.1 Definition of theme

Rail transport consists of all land passenger and freight transport which runs on both dual and single fixed rails. This principally involves heavy rail, light rail and tram but might also include funicular and monorail rail modes.

2.2 Topics included in theme

The topics included in this theme are:

- Fixed infrastructure for rail lines (planning, costing, evaluation, construction, financing, operation, maintenance and renewal) for rail lines and related infrastructures, including stations, depots, etc. Infrastructure improvements are aimed particularly at improving efficiency and safety and removing bottlenecks. EU support is directed particularly towards the Trans-European Road and Rail Networks (TEN-T budget) and to improving transport links in peripheral or disadvantaged areas (ERDF budget);
- rolling stock, including planning, design, costing, evaluation and financing;
- service planning, including capacity allocation, infrastructure charging, timetabling, pricing (fares and freight charges);
- rail demand forecasting;
- rail system evaluation;
- rail freight (Europe's railways focus mainly on providing passenger services but it is important to distinguish the role for freight services, how this might be facilitated and how it might change over time);
- industrial organisation, including regulation, ownership and competition, degree of vertical and horizontal separation, operations, leasing and franchising;
- interoperability between rail networks (track gauges, electrical systems and signalling, as well as staff issues). Lack of this can create inefficiencies, particularly at borders crossing terminals;
- rail-related issues, including competition and cooperation with other modes. A key focus in Europe is the promotion of intermodal freight transport, so to create a door to door transport chain, and multimodal passenger transport. This aims to increase overall efficiency of the transport system by using the comparative advantages of each mode, and making the best use of existing infrastructure; and
- the promotion of clean vehicles, Intelligent Transport Systems, traveller information, harmonisation of standards and regulations, open access, and the use of pricing and taxation as a tool to correct market failures are also research priorities in land transport.

All of the sectors, sustainability policy objectives and tools listed in the four-dimensional theme categorisation (Table in chapter 1) may be relevant to Rail Transport.

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.

As well as the research identified and summarised in Chapter 4, further developments are constantly being sought, and so further research requirements arise across the range of rail research topics. The European Rail Research Network of Excellence (EURNEX) has grouped research requirements as follows:

- Strategy and Economics – Research that develops and supports the business case for railways.
- Operation and System Performance – Research to understand and to evaluate the complex nature of the railway system and to assist its operational management.
- Rolling Stock – Research to develop innovative solutions to the challenges of tomorrow's rolling stock.
- Product Qualification Methods – Research to improve the effectiveness of testing and modelling and to develop product qualification methods for new techniques and technologies supporting the implementation of TSIs throughout the enlarged Europe.
- Intelligent Mobility – This area covers new communication, navigation and surveillance (inside or outside the vehicle) technologies able to answer the needs for lean, clean and clever transport systems.
- Safety and Security – Research to monitor safety, develop new technology and to promote safe and secure systems of operation that reduce risks with diminishing costs.
- Environment and Energy Efficiency – Research to address a number of environmental aspects, including: energy consumption and saving in electrified and diesel traction systems; electromagnetic pollution; noise and vibration; and influence of weather conditions on railway operation.
- Infrastructure and Signalling – Research to optimise the cost, reliability and availability of railway infrastructure.
- Human Factors – Research to enhance the understanding of roles, capabilities and needs of all stakeholders in the rail system.

2.3 Significance of theme

Railways deliver enormous economic, social and, particularly, environmental benefits. The last of these is particularly relevant with the current policy emphasis on sustainable transport. Rail travel has pronounced environmental benefits over road transport. It helps to relieve traffic congestion and reduce the number of road accidents. With continuing growth in air transport, it also provides congestion-free surface access to airports.

Regarding rail freight transport in Europe, despite there being a major reduction in the period from the 1970s to the early 1990s, from 1993 to 1998 there has been a 17 per cent increase in tonne-kilometres [3].

Regarding rail passenger transport, passenger km by rail has increased by 35% over the period 1970-1999, though this should be put in the context of growth in passenger km by car of 140% over the same period [3]. Furthermore there has been a change of emphasis, with more development of quality long distance services, both national and international, at the expense of more local services.

3. Policy context

European policy objectives related to theme

The EU transport policy white paper [3] remains the latest comprehensive statement of overall European transport policy, though the recently published Mid-Term Review of it [2] provides a useful update with some changes of emphasis. The 2001 White Paper's policies on rail may be divided into three groups:

- Increasing competition within rail;
- promoting socially efficient competition between rail and other modes; and
- creation of new rail infrastructure.

Competition within rail

Policy in relation to increasing competition within the rail sector focuses primarily on the implementation of the first railway package – enshrined in directives 2001/12 [5], 2001/13 [6] and 2001/14 [7] – and the agreement and adoption of subsequent packages of proposals.

The first railway package, adopted in 2001, already made provision for accounting separation of freight passenger and infrastructure, set the rules for infrastructure charges and provided a timetable for opening up the market for international freight services. Since then agreement has been reached on a second railway package focusing on safety, interoperability and domestic freight services, which lead to the adoption of a regulation and three further directives in spring 2004, and a third railway package focusing on international passenger services and the licensing of international train drivers has, again in spring 2004, been presented.

The second railway package was presented by the Commission in early 2002 and contained five key legislative proposals:

- An amendment of directive 91/440 on the development of the community's railways [8];
- a safety directive [9];
- an amendment to the directive on the interoperability on the trans-European conventional rail system [10];
- a proposal for a regulation to create a European Rail agency [11]; and
- a recommendation on the COTIF (COM2002/24) arrangements for international traffic.

The amendment to Directive 91/440 extends infrastructure access rights to freight services within any Member State and speeds up the opening up of the market. The opening up of the international rail freight market is to be completed by 2006, whilst the opening up for cabotage traffic – and hence the completion of open market access – is to be achieved by 1st January 2007.

A third railway package was presented in spring 2004 encompassing a further four legislative proposals:

- A proposal to amend directive 91/440 [12];
- a proposal for a directive on the certification of locomotive drivers [13];
- a proposal for a regulation on the rights and obligations of international rail passengers [14]; and
- a proposal for a regulation on compensation in cases of non-compliance with contractual quality requirements for rail freight services [15].

Under the proposed amendment to Directive 91/440, railway undertakings with a licence and the required safety certificates would, from 1 January 2010, be able to operate international passenger services in the Community, creating the potential for competition with existing international services such as Thalys and Eurostar. Operators would be permitted to pick up and set down passengers at any station on an international route, including stations located in the same Member State. The proposals are in line with the European Parliament's call, in 2003, for all rail passenger services, whether national or international, to be opened up to competition as of 1 January 2008.

Socially Efficient Competition between rail and other modes

Policy relating to the promotion of socially efficient competition between rail and other modes falls into two areas:

- Infrastructure charging – relating to all modes;
- fuel taxation – relating to road and to aviation.

The centrepiece of the white paper proposals on infrastructure charging was the Framework Directive. This was to have been accompanied by a methodology paper, setting out methodologies for calculating the components of the common infrastructure charge. It was anticipated that the methodology paper and Framework directive would be followed by a series of four separate Directive proposals dealing in detail with the practical implementation of pricing for road, sea, rail and air modes. However, other than some initial consultation with stakeholders there appears to have been no further progress with bringing forward the draft directive and it is now clear that it has been shelved.

Progress on infrastructure charging policy has occurred in both the rail and road sectors. Directive 2001/14, on allocation of railway infrastructure capacity and levying of charges, enshrined the proposals on railway infrastructure charging emerging from the 1998 railways package. The directive has been implemented throughout the EU and has been incorporated into member state law since Spring 2003. In summary, the directive determines that charges must be based on 'costs directly incurred as a result of operating the train service". They may include:

- Scarcity, although where a section of track is defined as having a scarcity problem, the infrastructure manager must examine proposals to relieve that scarcity, and undertake them unless they are shown, on the basis of cost benefit analysis, not to be worthwhile;
- environmental costs, but only where these are levied on other modes;
- recovery of the costs of specific investments where these are worthwhile and could not otherwise be funded;
- discounts but only where justified by costs; large operators may not use their market power to get discounts;
- reservation charges for scarce capacity, which must be paid whether the capacity is used or not;
- compensation for unpaid costs on other modes; and
- non discriminatory mark ups but these must not exclude segments of traffic which could cover direct cost.

In terms of intermodal competition between road and rail, the forthcoming Directive on charges for heavy goods vehicles, amending Directive 1999/62 on charges for heavy goods vehicles represents something of a step forward. Under the directive, member states can introduce charges for heavy goods vehicles on roads throughout their country. The charges will be, on average, tied to the costs of construction, operation, maintenance and development of the network plus the uncovered costs of accidents (including costs not covered by insurance). Tolls can be allocated to vehicle types on the basis of stipulated equivalence factors and will be capable of being varied according to a number of factors.

The use of the revenue is earmarked for expenditure on roads, other transport networks, transport substitutes or the transport sector as a whole. In exceptional circumstances a surcharge of up to 25% will be permitted, to fund alternative rail infrastructure.

Further to this, Directive 2003/96 on restructuring the Community framework for the taxation of energy products and electricity, adopted in autumn 2003, allows Member States to tax kerosene on domestic flights and, on the basis of bilateral agreements, intra-EU flights. Thus policy to permit the harmonisation of the terms of competition between modes regarding fuel tax does exist, although it has had no effect in practice as yet, and the position where air transport remains free of VAT, whilst in many countries rail transport bears VAT, remains unresolved.

Improving Rail Infrastructure

Policy relating to improving transport infrastructure again falls into 3 key areas:

- Revisions of the Trans-European Network;
- public funding for infrastructure; and
- linking user charges with infrastructure investment.

The relevant actions, set out in the White Paper's Action Programme are:

- Support the creation of new infrastructure, and in particular rail freight freeways;
- Revise the Trans- European Network guidelines in order to eliminate bottlenecks by encouraging corridors with priority for freight, a rapid passenger network and traffic management plans for major roads, and adding projects to the "Essen" list;
- Increase to 20% the maximum funding under the Trans-European Network budget for the main bottlenecks, including those still remaining on the Union's frontiers with the accession candidate countries, and then introduce conditionality rules;
- Present a more extensive revision of the Trans- European Network aimed in particular at integrating the networks of the accession candidate countries, introducing the concept of "motorways of the sea", developing airport capacities and improving territorial cohesion on the continental scale;
- establish a Community framework for allocating revenue from charges on competing routes to the construction of new infrastructure, especially rail infrastructure;
- link the future Member States to the EU's Trans- European Network by means of infrastructure of quality with a view to maintaining the modal share of rail transport at 35% in the candidate countries in 2010 by mobilising private-sector finance; and
- make provision in the Community's future financial perspective for adequate public funding of infrastructure in the new member countries.

In the Mid-Term Review of the 2001 White Paper (CEC, 2006), renewed emphasis is placed on:

- Completion of the internal market for international rail freight transport and progress with that for international rail passenger transport;
- Tackling structural obstacles to competitiveness, such as "low levels of interoperability, the lack of mutual recognition of rolling stock and products, the weak coordination of infrastructure and interconnection of IT systems and the problem of single wagons loads" (CEC, 2006);
- Progressing the implementation of the priority TEN-T projects (most of which are rail projects), including the ERTMS rail traffic management system; and
- Legislating for rail passenger rights, similar to those introduced for air passengers.

4. Synthesis of findings from completed projects

Research projects contributing to the theme of **Rail Transport** can be broken down to the following sub-themes:

- Planning and development of passenger rail systems;
- planning and development of rail freight;
- safety and interoperability; and
- competition and industrial organisation.

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-1.1 Passenger Transport;
- D2.E-1.2 Freight Transport;
- D2.E-2.6 Intermodal Transport;
- D2.E-3.2 Efficiency;
- D2.E-4.3 Infrastructure Provision (incl. TENs);
- D2.E-4.6 Regulation / Deregulation;
- D2.E-4.8 Transport Management;
- D2.E-4.9 Pricing, Taxation and Financing Tools; and
- D2.E-4.10 Vehicle Technology.

Results from the following **24** projects have been included in this Thematic Research Summary:

Research sub-theme	Contributing projects
Planning and development of passenger rail systems	ADVISOR; B6; BAHN.VILLE; CROSSRAIL; F4; FACT; H102N; HVB2; LIBERTIN; Passenger rail services and economic performance
Planning and development of rail freight	FIRE; F-MAN; HISPEEDMIX; Road to Rail; ROLLING SHELF
Safety and Interoperability	ESCUGIBRI; LOCOPROL; PROMAIN; SAFET; SAMNET; SISMODCOMPROT
Competition and Industrial organisation	D2; IMPROVERAIL; Strengthening of the competitive environment of rail passenger transport

4.1 Planning and development of passenger rail systems

4.1.1 Research objectives

In this area research objectives include to:

- Identify market and technological measures that can enable increased efficiency and market penetration for long distance rail passenger services;
- analyse the integration of the Swiss transportation network into the Trans-European Network (TEN);
- promote and facilitate successful rail oriented urban and regional development;
- develop a model of the national rail system in the UK, to link with the UK multimodal National Transport Model;
- examine and quantify the damage done to the performance of the economy by poor rail performance;
- improve the management of rail and other public transport networks through better exploitation of data from CCTV cameras;
- examine the consequences of track layout for the operation of tilting trains and investigate the onset of passenger nausea resulting from the operation of high-speed, tilting trains;
- assist railways in upgrading their electrical infrastructure at low cost and low environmental impact;
- improve the quality, safety and efficiency of light rail systems; and
- examine the potential for integrating tram/light rail systems with conventional rail.

4.1.2 Main findings

The long distance rail passenger transport system has the technological potential to maintain its market position and even to extend it considerably. The most important challenges have been found to exist in the area of reduction of costs for tracks and rolling stock, with the introduction of new kind of tracks, optimisation of maintenance and increases in the amount of standardized elements and modules. Looking further into the future, technological efforts can begin to be used in the fields of automatisation, ticketing, train control and management technology. Also, use of radio technology in the field of train management systems could allow a self operating transport system.

Optimising border-crossing transport provisions for long-distance travelling through Switzerland has been identified as a priority for the Swiss government. Whilst Swiss domestic rail services are viewed to be high quality, it has been found that their links with the EU, and with the TEN-T in particular, are less well-developed. For example, just 3% of all connections are very good, i.e. faster than 120 km/hr.

An analysis of travelling times shows that rail transport offers advantages in only relatively few cases, or is at best level with individual motor vehicles.
Linking urban development and rail development policies has been found to promote sustainable spatial planning and transport at the regional and local level. The attractiveness of rail for people who have a choice of different modes is increased both by quantitative improvements to the local/regional rail service (such as frequency, clock face timetable and spread of services through the day) and by qualitative improvements (comfort, service,

new rolling stock, etc). Guidelines and methodological tools have been developed for local authorities and partners to assist in rail oriented urban and regional development. Evidence shows that poor rail performance has a significant impact on individuals, the economy, and society in general and, hence, improvements in performance have a significant value attached to them. A conservative estimate for Britain of total disutility (relative to an ideal world of zero delays) is equal to around £2.2-£2.5 billion per annum, which is approximately equal to two-thirds of the total annual ticket sales on Britain's railway. Poor rail performance is disaggregated into four broad areas of impact:

- Direct harm to business travellers and business;
- indirect harm to business;
- harm to commuters; and
- harm to leisure travel and tourism.

Research has demonstrated the feasibility of using computer vision algorithms to detect unusual human behaviour. This can then be used to improve the effectiveness of existing security operators. It is particularly effective in a metro environment but could be adapted to other situations such as railway stations, airports and shopping malls.

Work relating to light rail has led to a number of initiatives to help introduce recommendations at specific national levels and help overcome regulatory obstacles; for example via the establishment of UK Tram and the LRT Forum. However, in some areas voluntary agreements are not sufficient; for example, community legislation is the only way to achieve an appropriate level of technical harmonisation in a number of areas (e.g. Crashworthiness, Power Supply, and System Performance). Hence, the Commission drafted a proposal for a directive on urban rail in 2004.

4.2 Planning and development of rail freight

4.2.1 Research objectives

In this area research objectives include to:

- Improve the sustainability of rail freight transport and the competitiveness of Railway Cargo Operators;
- encourage a modal shift from road transport to rail based services through technological innovations and organisational measures;
- specify and develop new freight vehicles (i.e. wagons and trains) and improve transhipment facilities;
- provide railway cargo operators with innovative tools to control their international wagon fleet, and to enhance the productivity of wagons;
- build and test a prototype of an information service concerning rail-based international freight transport, for use by Rail Cargo Companies and transport and logistics service providers; and
- assess the market requirements for high-speed freight traffic and the capability of the existing high-speed network to cope with a mix of high-speed and conventional freight traffic.

4.2.2 Main findings

Research has identified good practice in promoting intermodal transport of bulk freight within the commercial sector, with one particular initiative being predicted to transfer 360,000 tonnes of bulk traffic from road to rail in 2006. This initiative would result in 14,500 fewer truck round-trips being performed, amounting to some 5.9 million miles a year, using 3.35 million litres of diesel fuel. This quantity of fuel, if used, would have generated 8.85 million kilograms of carbon dioxide. Work has also identified a healthy potential to grow the market for rail-based palletised goods and parcels on short distances, with both segments estimated to grow at about 75% by the year 2015. New types of pallet, and of wagons able to accommodate the new pallets and travel at high speeds of up to 160 km/h;, as well as a network of 53 terminal locations for central European countries have been designed that might facilitate this growth.

Research has resulted in the design of innovative tools for Railway Cargo Operators and fleet managers to control their wagon fleet, and hence to enhance the productivity of rail freight. One software tool comprises a set of linked modules, including:

- Tracking System Module (TSM) to locate wagons wherever they are in Europe, and to retrieve wagon status information (loaded, unloaded, moving, etc);
- Data Processing Module (DPM) to progressively estimate the Expected Time of Arrival (ETA) for each wagon, and to make available all information regarding wagon history;
- Asset Management Module (AMM) to propose a proper choice of wagons to comply with clients' orders, according to customisable productivity indicators; and
- Graphical User Interface (GUI) to present the fleet manager, in an intuitive and user friendly way, wagons position and operating data on geographical maps.

Another tool enables wagon and train monitoring including positioning, delays, arrival forecasts, wagon and goods status, provision of information relating to commercial offers and on-line data exchange. Overall, the research provides an information platform for the future European One Stop Shop, suggesting that opposition of railway companies to outsource information services and to pass on information to external parties can be overcome. Nevertheless, whilst these tools exist, their commercial viability is less certain and calls for further analysis of the suitable commercial conditions.

A methodology to evaluate the investment return and profitability of European international high-speed rail freight has been developed and a potential traffic matrix has been estimated. The premium freight market, mainly made up of air freight, integrator traffic, postal service and express road service, appears particularly suitable for high-speed services, and the best economic returns have been identified for direct-night time connections covering distances up to approximately 1500-1800 km. In a number of situations present equipment would already allow trains to travel up to 300 km/h, with no extra associated maintenance requirement (except for that provoked by the traffic increase). Furthermore, the anticipated economic returns from investing further in high-speed rail freight are encouraging. It is concluded that, in the medium to long term, high-speed freight railway service has the potential to enhance rail freight overall, with consequent favourable impacts on modal split. The success of high-speed rail will be strongly affected by organisational factors rather than technical ones. As international co-operation seems to be essential, national railway operators might form together new high-speed rail companies.

4.3 Safety and interoperability

4.3.1 Research objectives

In this area research objectives include to:

- Support the efforts of the EU and of the railway industry to achieve railway interoperability in Europe;
- define a new multi-technology location system based on satellite positioning combined with fail-safe on-board track mapping and interlocking, that is compatible with ERTMS/ETCS and that can be applied, in the short term, to low Density Traffic Lines;
- enhance the performance of railway infrastructure through application of innovative knowledge, tools and methodologies in the areas of infrastructure maintenance, management, development and new safety approach for railways;
- share knowledge relating to Trans–European safety requirements, Particularly in relation to the SMART rail Single Market for Rail Transport services and its approach to railway safety management;
- develop comprehensive guidelines for pan-European decision-making on the safety of existing tunnels (primarily road but also rail)
- share and enhance knowledge regarding railway electrical systems compatibility among all players in the railway community, in order to improve safety and operational reliability, and to reduce time and cost for the acceptance of new vehicles on existing railway systems; and
- design and implement modern equipment for electrical power lines for railways compliant at European level.

4.3.2 Main findings

Research has developed an innovative cost-effective satellite based fail-safe train location system as the core of a train protection, control and command system. This achieves a significant cost reduction by concentrating more intelligence on-board the train. The system enhances and extends the ERTMS/ETCS system, currently covering high density lines, to low density lines by its achievement of significant cost reductions and could be suitable for implementation in the short term.

Considerable effort has been made to initiate discussion and sharing of knowledge in the area of safety and interoperability. For example, sharing of knowledge in relation to innovative tools and methodologies has enabled the application of better construction principles, management and safety approaches. Discussions also facilitated the identification of implementation issues arising out of the Railway Safety Directive and potential solutions, and the investigation of the relationship and dependencies between Interoperability and Safety Directives. Further discussions have focused on tunnel safety, and led to the production of Best Practice European Guidelines for improving safety in road and, to a lesser extent, rail tunnels.

4.4 Competition and industrial organisation

4.4.1 Research objectives

In this area research objectives include to:

- Improve the efficiency of the rail system via a focus on the interaction between the different agents acting within and across the different levels of planning and control (that is, the institutional relationship between the railway managers and the other agents of the system);
- analyse railway reforms within the EU and the rail reform 1996/99 in Switzerland and compare the different reforms with those undertaken elsewhere; and
- identify measures to improve the competitive environment of rail passenger transport in the Slovak Republic, in connection with its integration with the EU.

4.4.2 Main findings

A methodological framework along with a self-assessment management tool has been developed, aiming at supporting Business Process Re-engineering (BPR) perspectives among Railway Infrastructure Managers. This involved taking the general principles of BPR and amending them with specific attention to the specificities of BPR in Railway Infrastructure Management. The framework was developed into a software Toolbox, featuring an interactive electronic book, complemented by a user's manual. It was found that business processes need to be split. This is a challenge, as the infrastructure managers need to balance the "income from infrastructure charges", based on effective (but complex) cost analysis. This is however simply absent most of the time, as it depends on information that cannot be easily and readily obtained.

Another challenge is to balance revenues from charging core activities with "State funding". Also necessary will be to manage "infrastructure expenditures" while reducing the costs of provision of infrastructure and the level of access charges "with due regard to safety and to maintaining and improving the quality of the infrastructure service".

The main challenges for Railway infrastructure managers in contributing to the overall success of the railway sector have been identified as:

- Competitiveness concerns and commitment towards intermodality;
- optimisation of railway capacity based on maintenance and renewal planning tools;
- promote smooth infrastructure provision across EU Member States;
- reaching higher efficiency in network provision and capacity allocation;
- specification of data requirements for the development of information systems;
- foster financial sustainability of railway Infrastructure Management;
- promote continuous improvement and implement best practices;
- clarifying the role of charging in promoting access to services including the different capacity allocation strategies combined with the levying of the charges;
- discussing the adherence of Marginal Cost pricing principles to the recent EC Directives; and
- quality of the infrastructure for the valuation of the provided service.

5. References

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[4] European transport policy for 2010: time to decide', White Paper; COM(2001)370, CEC, 2001, Brussels

[5] Directive 2001/12/EC of the European Parliament and of the Council of 26 February 2001 amending Council Directive 91/440/EEC on the development of the Community's railways, 2001, Brussels

[6] Directive 2001/13/EC of the European Parliament and of the Council of 26 February 2001 amending Council Directive 95/18/EC on the licensing of railway undertakings, 2001, Brussels

[7] Directive 2001/14/EC of the European Parliament and of the Council of 26 February 2001 on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification, 2001, Brussels

[8] Directive 2004/51/EC of the European Parliament and of the Council of 29 April 2004 amending Council Directive 91/440/EEC on the development of the Community's railways, 2004, Brussels

[9] Directive 2004/49/EC of the European Parliament and of the Council of 29 April 2004 on safety on the Community's railways and amending Council Directive 95/18/EC on the licensing of railway undertakings and Directive 2001/14/EC on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification (Railway Safety Directive), 2004, Brussels

[10] Directive 2004/50/EC of the European Parliament and of the Council of 29 April 2004 amending Council Directive 96/48/EC on the interoperability of the trans-European high-speed rail system and Directive 2001/16/EC of the European Parliament and of the Council on the interoperability of the trans-European conventional rail system, 2004, Brussels

[11] Regulation (EC) No 881/2004 of the European Parliament and of the Council of 29 April 2004 establishing a European railway agency (Agency Regulation), 2004, Brussels

[12] Proposal for a Directive of the European Parliament and of the Council amending Council Directive 91/440/EEC on the development of the Community's railways (presented by the Commission) {SEC(2004) 236}, COM(2004) 139 final, CEC, Brussels

[13] Proposal for a Directive of the European Parliament and of the Council on the certification of train crews operating locomotives and trains on the Community's rail network (presented by the Commission), COM(2004) 142 final, CEC, Brussels

[14] Proposal for a Regulation of the European Parliament and of the Council on International Rail Passengers' Rights and Obligations, COM(2004)143 final, CEC, Brussels

[15] Proposal for a Regulation of the European Parliament and of the Council on compensation in cases of non-compliance with contractual quality requirements for rail freight services, COM(2004)144 final, CEC, Brussels

Annex I: Contributing projects

Preface This Annex lists all the projects (European and national) which belong to the **Rail Transport** 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

Theme: **Rail Transport**			Last update: **17 August 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
ADVISOR	Annotated digital video for surveillance and optimised retrieval	EU	Planning and development of passenger rail systems
Key findings The ADVISOR project has demonstrated the feasibility of using computer vision algorithms to detect unusual human behaviour and to use this to improve the effectiveness of existing security operators. It is particularly effective in a metro environment but could be adapted to other situations such as railway stations, airports and shopping malls. Policy implications None Project contact mike.naylor@thalesgroup.com			
ASYNUD	Development of an asynchronous driving unit	EU	
Project website www.eureka.be/ifs/files/ifs/jsp-bin/eureka/ifs/jsps/projectForm.jsp?enumber=2195			
B6	Integration into the European network: passenger transport	CH	Planning and development of passenger rail systems
Key findings • An analysis has proved that only a small percentage of the population in 33 centres in Western, Central and Southern Europe can be reached by day journeys; • just 3% of all connections are very good, i.e. faster than 120 km/h; and • an analysis of travelling times shows that rail transport offers advantages in only relatively few cases, or is at best level with individual motor vehicles. Policy implications • Optimising border-crossing transport provisions for long-distance travelling through Switzerland should			

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have priority. If possible, InterCity and InterRail transport should be extended to centres at the border.
- International long-distance transport (i.e. rail transport) should be extended beyond Switzerland's larger centres to medium-sized centres, and to tourism centres in particular.
- Increasing passenger volumes would justify increased frequencies as improved provision creates higher passenger volumes. In particular direct connections should be developed.

Project contact

pm@metron.ch

BAHN.VILLE	Promoting a rail oriented urban development approach for urban regions in Germany and France	INT	Planning and development of passenger rail systems

Key findings

- The importance of proximity (physical and/or temporal) to the station in the use of rail underlines the interest in an urban development close to the stations.
- The existence of a rail service can be an important factor for people choosing where to live: surveys have shown that this is particularly true for young households where there are two working people but only one car. This implies the need for urban construction or renewal programmes to provide a wide diversity of housing types.
- Measures to refurbish and modernise stations improve the image of the whole locality around the station as well as improving services to rail users.
- Where a town is situated some distance from its railway station, the station can constitute a linking element, limiting the effect of urban severance caused by the rail infrastructure.

Policy implications

- Bahn.Ville adopted an original, cross-border approach, based on both scientific knowledge and experience at the practice level. It succeeded in promoting sustainable spatial planning and transport at the regional and local level.
- The project provides guidelines and methodological tools for local authorities and other partners to succeed in rail oriented urban and regional development. The main results are the exchange of experience, findings on impacts and processes levels, a feasibility study of the schematisation and recommendations.

Project contact

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COMBINE II	Enhanced control centres for fixed and moving block signalling systems 2	EU

Project website

www.combine2.org

COMPOSIT	The Future Use of Composites in Transport	EU

Project website

www.compositn.net

Theme: **Rail Transport**			Last update: **17 August 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
CONPASS	Better Connections in European Cross-Border Passenger Transport	EU	
Project website www.conpass.org			
CROSSRAIL	Integrating Local and Regional Rail Including Cross Border Aspects	EU	Planning and development of passenger rail systems
Key findings • Integrating tram/light rail systems with conventional rail • Evaluation of tramtrain in the cross-border context • Market projections for tramtrain vehicles • Development of a Functional Requirement Specification for a universal modular 3-system tramtrain vehicle, also applicable to 2-system vehicles			
Policy implications N/A			
Project contact djon.larsen@atkinsglobal.com			
D2	Railways: Competition and basic mobility	CH	Competition and industrial organisation
Key findings • Economic compatibility of rail transport should be increased by rail reforms (deregulations). • The changes that have taken place since the beginning of 1999 are inadequate. • Railway transport competition and public services are not incompatible.			
Policy implications • Of importance is the implementation of the Rail Reform 1996-99, then our suggested reforms could be initiated. • Individual railway companies are not capable of designing the re-engineering. Hence, impulses for further reforms must come from federal and cantonal government authorities. • Important elements for future programmes: infrastructure, competition, network access and service ordering.			
Project contact niklaus.lundsgaard-hansen@ch.pwcglobal.com			
ERRAC	European Rail Research Advisory Council	EU	
Project contact lara.isasa@unife.org			

Theme: **Rail Transport**			Last update: **17 August 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
ESCUGIBRI	ESC UserGroup and InfoBank to support Rail Interoperability	EU	Safety and interoperability
Key findings Exchange and enhancement of the knowledge in the domain of Electrical Systems Compatibility (ESC) of railways. Policy implications None. Project contact stuart.shirran@se.transport.bombardier.com			
ETIS-LINK	Thematic network for European transport policy information system development	EU	
Project website www.etis-link.info			
EUROMAIN	EUROpean railway open MAINtenance system	EU	
Project website www.euromain.org			
EUROTOURISM RAIL MOUNT	Development Of An Asynchronous Driving Unit	EU	
Project website www.eureka.be/ifs/files/ifs/jsp-bin/eureka/ifs/jsps/projectForm.jsp?enumber=2195			
F4	Technical perspectives of rail transport	CH	Planning and development of passenger rail systems

Key findings

- In case of the long distance passenger transport the transport system rail has the possibility and also the technological potential to keep its market position and even to extend it considerably.
- The correct assessment of the frame conditions and the consequent evaluation and use of technologies is necessary for the successful realisation of a growth-strategy.
- The expenditure for developing and using efficient technology has to be reduced decisive.
- The time between testing and using a system has to be shortened.

Short term

- The most important challenges exist in the area of reduction of costs for tracks and rolling stock (new kind of tracks and optimisation of maintenance).
- Increasing of the amount of standardized elements and modules.

Long term

- It can be begun to use the technological efforts in the fields of automatisation, ticketing, train control and management technology.
- The using of radio technology in the field of train management systems allows a self operating transport system.

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Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			

- The rail industry will have the possibility to realise rolling stock with shorter life-time, optimal LCC and lower procurement costs.
- Electronic ticketing facilities.

Policy implications

- Considerable efforts for the railways are necessary to achieve better efficiency and market penetration in the production.
- The infrastructure owners have to reduce the infrastructure usage costs and have to apply an optimal slot usage management.
- The authorities as a neutral instance have to regulate the modalities for the access to the infrastructure. They also have to protect the national and regional interest.
- The industry and research have to develop the technical solutions.

Project contact

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FACT	Fast and comfortable trains	EU	Planning and development of passenger rail systems

Key findings

Two reports were published, giving rich synthetic information on the consequences of track layout and comparing European Standards and national limits. Also, a method was found and applied that permits a regression analysis of the results test runs who investigate nausea. Key elements in the new method are:

- Net dose evaluation of the parameters having influence on nausea; and
- Excel solver like optimising of parameters like time constant; scale factor and regression constant (or a binary method finding local extreme).

Policy implications

The key recommendations relate to the further work required. On the basis of the experience of the tests executed by the consortium and the general knowledge in this field, the following aspects need to be studied further before new line experiments can be held:

- What is the confidence zone of the average net dose parameters an homogeneous group of males , exposed to a sinusoidal vibration of X Hz, level Y m/sec2?
- What is the confidence zone of the average net dose parameters a homogeneous group of females, exposed to an identical stimulation?
- What is the influence of age and homogeneous group?
- What is the influence of reusing people?
- What is the best weighting function for roll speed?
- What is the best weighting function for fore and aft acceleration?

Project contact

Tel: +31-30-2324807

Theme: **Rail Transport**			Last update: **17 August 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			

FIRE | Freight information in the railway environment | EU | Planning and development of rail freight

Key findings

- The development of the general architecture for an information service for rail-based international freight transport;
- The FIRE Service provides information on: (i) train schedules and wagon plans (ii) wagon and train monitoring including positioning, delays, arrival forecasts, wagon and goods status (iii) commercial offers including available services and tariffs.
- Data about freight wagons is acquired from a range of different sources and made available via a range of means, including access over the internet;
- A Pilot Service, with a slightly different architecture, has been tested for a selection of wagons, international routes and consignments;
- It has been demonstrated that an information system for rail with the following characteristics is feasible: - consignment-orientation (instead of the present wagon-orientation), - modular software architecture, - delay indication on the basis of the timetable of the wagon, - integration of UIC-data framework such as HERMES, - data security.

Policy implications

The FIRE project has provided an information platform for the future European One Stop Shop showing that opposition of railway companies to outsource information services, like the FIRE Service Provider, and to pass on information to external parties can be overcome. Although the technology for the FIRE Service Provider is available on the market, the commercial breakthrough of the system is still less certain and calls for further analysis of the suitable commercial conditions. The pilot has suggested that improvements on the map display could be introduced in the future. Specifications of the On-Board Terminal and the Information Gateway, and definition of the interfaces provide a basis for future standardisation. In particular, the FIRE Consortium believes possible that FIRE specifications are taken as a basis for UIC-standardisation of GPS data transfer and has initiated discussions with UIC on this. The project results suggest also that AVI systems should be given less preference as main localisation systems compared to GPS/GSM based systems.

Project contact

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F-MAN | Rail Car Asset Management | EU | Planning and development of rail freight

Key findings

F-MAN prototype, designed to provide Railway Cargo Operator (RCO) fleet managers with innovative tools to control his wagon fleet, and to enhance the productivity of wagons. The F-MAN prototype consists of:

- Tracking System Module (TSM) to locate wagons wherever they are in Europe, and to retrieve wagon status information (loaded, unloaded, moving, etc);
- Data Processing Module (DPM) to progressively estimate the Expected Time of Arrival (ETA) for each wagon, and to make available all information regarding wagon history;
- Asset Management Module (AMM) to propose a proper choice of wagons to comply with clients' orders, according to customisable productivity indicators;
- Graphical User Interface (GUI) to present the fleet manager, in an intuitive and user friendly way, wagons position and operating data on geographical maps. Service, support & training for installation and use Service, support & training for installation and use deal with all those activities that allow Railway

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Cargo Operators (RCOs) to properly use the F-MAN tools.

Policy implications

F-MAN impacts positively on the implementation of the Information Society and Telecommunication policy. It aims at providing tools that make the management of railcar fleet possible under a European coverage, something that is currently impossible. F-MAN is also an important key to the completion of a freight-related information society. For instance, it would be possible to make available the state of the shipment, or the additional costs due to over routing to the customer requiring the shipment (or to the consignee), with integration of F-MAN with already existing or brand-new software for shipment tracing, or to common EDI systems. F-MAN has positive impacts on the implementation of the EU Transport policy. It enables efficiency-improvements, and thus increased capacity and productivity, in the European rail freight transport network. It therefore contributes to increasing the competitiveness of rail transport with respect to road. It does this by contributing to: Rail network interoperability; operational cost reductions; Improved network coverage throughout the EU; and development of a single market for rail.

Project website

www.civil.ntua.gr/f-man/

GTO	Gto Thyristors (Gate Turn Off Thyristors)	EU	

Project website

www.eureka.be/ifs/files/ifs/jsp-bin/eureka/ifs/jsps/projectForm.jsp?enumber=24

H102N	Integrated National Rail Model Development	UK	Planning and development of passenger rail systems

Key findings

This project resulted in the development of the National Rail Model (NRM). The main features of the model are that:

- The model has rail network and service representations for both AM peak and inter-peak periods, rail services being coded to the 1999/2000 timetable. It covers all British passenger rail operations in the UK;
- It uses the 1997 National Rail Passenger Model (NRPM) trip data as the base for the development of the Base Year (i.e., 1998) rail demand matrices, supplemented by the London Underground trips derived from FaberMaunsell's South East Regional Rail Model (SERRM), which in turn were developed from LATS data, as these are not included in the NRPM data;
- It adopts an incremental process such that the future year trips will use the base year rail demand travel patterns as the base, but the impacts of policies on trips in a future year are controlled by Pass1;
- For any model runs, future year trips from Pass1 will be automatically disaggregated to the DRDM zone level, using elasticity to population and generalised rail cost;
- It provides an option for updating demand matrices without going through the Pass1 interface by using elasticity to generalised time and cost, which also includes the rail fare elements;
- An incremental public transport assignment process with a crowding time calculation mechanism to reflect the effect of overcrowding on routing and overall rail generalised cost;
- A set of Rail Policy User interfaces that provide a friendly environment for the user to specify for model testing various rail service and/or policy changes associated with the Ten Year Plan in ways which are efficient; and
- Model outputs that include passenger-kms, passenger-hours, PIXC indicators and emissions, all of which can be categorised by corridor and/or area type.

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Policy implications

The NRM is a component part of the multi modal National Transport Model (NTM). The NTM has been used to formulate transport policy across all modes, most recently in the 2004 Future of Transport White Paper. The NTM is undergoing a major update and recalibration including the development of a new rail modelling methodology. The NRM referred to in this project is no longer used.

Project contact

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HEROE	Harmonization of European Rail Rules for Operating ERTMS	EU	

Project contact

Claudio Traverso; Tel: +32 2 673 9 933

HISPEEDMIX	High-Speed Freight on the European High-Speed Railway Network	EU	Planning and development of rail freight

Key findings

- The project has developed a methodology to evaluate the investment return and profitability of high-speed rail freight.
- A potential traffic matrix has been estimated with 231 connections between 22 European cities.
- High-speed service has appeared suitable, in the beginning, for the premium freight market mainly made up of air freight, integrator traffic, postal service and express road service.
- Best economic returns have been reached in direct-night time connections covering distances up to approximately 1500-1800 km.
- The cash flow expected to be generated by the whole HISPEEDMIX service investment over 30 years has, encouragingly, been characterised by an internal profitability rate up to 11,75%.
- Case study results have shown that present equipment would already allow trains to travel up to 300 km/h, and no extra maintenance arrangements have been requested by the implementation of high-speed rail freight services, except for those provoked by the traffic increase.

Policy implications

In the short-term the know-how and capital investments dominate the overall production costs of high-speed freight railway transport. In the medium to long term, high-speed freight railway service will improve qualitatively and quantitatively the whole rail transport service with a consequent favourable change in the modal split. The success of this new service will be strongly affected by organisational factors rather than technical ones. As international co-operation seems to be essential, national railway operators could form together a new HISPEEDMIX company. Before starting with a pilot service, a detailed feasibility study on specific corridors, a specific business plan and a handbook on the technical and managerial aspects of the service should be built up. After initially focusing on the premium freight market, the service could be step-by-step extended to other customers.

Project contact

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Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
HVB2	High Voltage Booster - Second Phase	EU	Planning and development of passenger rail systems

Key findings

The project will develop and validate the HVB device for railway systems at 25KV-50Hz. The concept of this device has been studied in HVB project ('98-DGVII) and will face the urgent need of European railways to upgrade their electrical infrastructure at low cost and low environmental impact, in order to face the increasing request of traffic.

Policy implications

None.

Project website

www.sncf.com/wcrr/SP/278.PDF+High+voltage+booster+second+phase&hl=de&ie=UTF-8

IMPROVERAIL	Improved tools for railway capacity and access management	EU	Competition and industrial organisation

Key findings

A methodological framework along with a self-assessment management tool was developed, aiming at supporting BPR way of thinking among Railway Infrastructure Manager (IM), according to the general principles of Business Process Reengineering (BPR), but in attention to the specificities of BPR in Railway Infrastructure Management. This generic but innovative BPR methodology is supported by inputs accrued from the cross sectional work carried out in IMPROVERAIL. The main concern driving its development has been the easiness in use and applicability in most IM structures. The IMPROVERAIL has attempted to segment railway companies as production, commercial and market oriented organisations, which is required in order to compare the appropriateness of the technique in different circumstances. Representative processes were therefore chosen in each of the three identified areas of the organisation: operational, commercial and managerial. The BPR methodological framework provided in IMPROVERAIL consisted of 5 phases: Understand the environment, Set the Objectives, Use tools to accomplish them, Produce outputs and Recommend activities/implementation. This framework is also as a software Toolbox, featuring an interactive electronic book, complemented by a user's manual.
During IMPROVERAIL, pilot case studies were carried out. The following aspects were studied:

- Prospective Network Capacity Management;
- Long Term Planning;
- Short Term Planning;
- Life Cycle Cost (LCC) in Infrastructure Management;
- Allocation of Network Capacity and Charging Issues;
- Railway Infrastructure Benchmarking – identification of best practices;
- Information Systems in railways.

Policy implications

By proposing the split of train Operation from the Network Possession and Management, the EU has paved the way to a deep structural change aiming to enable better economical usage of the railway assets, further creating the conditions for competitiveness in railway transports; to a large extent due to the fact that the concept of a Public Railway (for long, kept away from private sector logic), has progressively proven problematic, at the cost of growing operation deficits, which are today urgent to keep under tight control. In that sense, splitting operation from network was, naturally, a milestone.
Business processes need to be split. This is necessarily a crucial challenge for railway, as the IM need

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now to balance the “income from infrastructure charges”, based on effective (but complex) cost analysis. This is however simply absent most of the times, as it depends on information that cannot be easily and readily obtained.
Another challenge is to balance revenues from charging core activities with “State funding”. Also necessary will be to manage “infrastructure expenditures” while reducing the costs of provision of infrastructure and the level of access charges “with due regard to safety and to maintaining and improving the quality of the infrastructure service”.
As the transport industry becomes more international and deregulated, rail transport in Europe should be able to take actions looking at the EU dimension rather the individual Member States. Moreover, IMs should develop specific measures based on a strategic definition of long term goals, accounting for the thorough understanding of the new requirements of railway undertakers and stakeholders in general.
The main challenges for Railway IM contributing to the overall success of the railway sector are associated to the following topics:

- Competitiveness concerns and commitment towards intermodality;
- optimisation of railway capacity based on maintenance and renewal planning tools;
- promote smooth infrastructure provision across EU Member States;
- reaching higher efficiency in network provision and capacity allocation;
- specification of data requirements for the development of information systems;
- foster financial sustainability of railway Infrastructure Management;
- promote continuous improvement and implement best practices;
- clarifying the role of charging in promoting access to services including the different capacity allocation strategies combined with the levying of the charges;
- discussing the adherence of Marginal Cost pricing principles to the recent EC Directives; and
- quality of the infrastructure for the valuation of the provided service.

Project contact

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LIBERTIN	Light Rail Thematic Network	EU	Planning and development of passenger rail systems

Key findings

The project had 10 working groups which all generated particular results, summarized as follows:

- Access – a key result was a recommendation on the Boarding and Alighting 'Vertical Step and Horizontal Gap' issue.
- Derailment Prevention and Ride Quality – The major part of this effort has been focused on producing a specification of the vehicle-track interface, which will facilitate derailment prevention and ride quality with standard vehicle designs.
- HVAC (Heating and Ventilation, Air Conditioning) – consensus-building between operators, vehicle manufacturers and HVAC system suppliers regarding cost reduction, modularity and harmonisation of system requirements.
- Loading Parameters – agreement that the existing standard (EN 12663), relating to vehicle structural design, should include a fixed value for loading parameters in relation to LRV's.
- Fire Safety – Consensus was reached to ask CEN to add or amend a specific category to the prEN45545, which currently does not clearly take into account the specifics of Light Rail vehicles.
- Structure Gauging – The structure of the CEN standard was discussed and consensus was reached that several gauging classes should be defined, ideally 2, or max 3 classes related to the insertion capacity in the urban area.
- Maintenance Management – a review of current status and developments, best theory and practice

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was undertaken to serve as practical Guidelines to help new or existing light rail systems reduce their Life Cycle Costs (LCC) and so to improve their viability.
- Tendering Procedures – development of a procurement process model to simplify the tender documentation, enabling system interfaces and dependencies to be managed throughout the procurement process.

Policy implications

LibeRTiN was a Thematic Network, providing a tool and a climate to foster dialogue. It has given rise to a number of initiatives to help introduce recommendations at specific national levels and help overcome regulatory obstacles. One example is the recent set-up of UK Tram and the LRT Forum.
In addition, the project confirmed that in some areas voluntary agreements were not sufficient to overcome some obstacles and that community legislation was the only way to achieve an appropriate level of technical harmonisation in a number of areas (e.g. Crashworthiness, Power Supply, and System Performance). Therefore UITP and UNIFE joined forces to support the commission in drafting a proposal for a directive on urban rail which was the basis for the public consultation phase in late 2004 and early 2005. The proposed directive makes up an overall regulatory framework for technical harmonisation which will be detailed partially by using the output of LibeRTiN working groups.
More specifically, some of the LibeRTiN topic groups (Fire Safety, Gauging) provided direct input to the existing CEN/CENELEC working groups to ensure that light rail will be adequately taken into account, which somewhat sped up the CEN-process.

Project website

www.libertin.info

LIIIFT	Long Innovative, Intermodal and Interoperable Freight Trains	EU	

Project contact

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LOCOPROL	Low cost satellite based train location system for signalling and train protection for low density railway lines	EU	Safety and interoperability

Key findings

The main results of the project are as follows:
- A new multi-technology satellite based train location system based on satellite positioning combined with fail-safe, on-board track mapping & interlocking;
- a new control & command system including a token-based simplified interlocking system and positive train detection;
- interoperability with ERTMS – Integration of satellite based odometry in ERTMS/ETCS onboard architecture;
- end user interface;
- a fail safe worker terminal (specification); and
- a tool for geographical database creation for railway lines.

Policy implications

The project has developed an innovative cost-effective satellite based fail-safe train location system as the core of a train protection, control and command system, thereby achieving a significant cost reduction by concentrating more intelligence on-board. The proposed innovations have achieved a significant reduction

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of the cost aiming to short term applications for low density traffic railway lines. The developed system enhances and extends the ERTMS/ETCS system, currently covering high density lines, to low density lines. Further work is required to upgrade the whole system to make it industrially available, either for the EU market, where it must be compatible with ERTMS/ETCS equipped lines, and the NON EU market, where there are no constraints concerning other equipment. Project website www.locoprol.org			
LOGCHAIN MODLOC	Modernisation of Diesel traction vehicles for East-West transit services on the wide-gauge metallurgic railway line	EU	
Project website (or contact) none			
LOGCHAIN RAIL GAUGE CHANGE	Economic Study Into Investment In An Automatic Rail Gauge Change System Within Pan-Corridor 1	EU	
Project website www.eureka.be/ifs/files/ifs/jsp-bin/eureka/ifs/jsps/projectForm.jsp?enumber=2353			
LOGCHAIN SLINT	Sea-land intermodal transport along the Gdansk-Odessa transport corridor	EU	
Project website (or contact) none			
LPG RAIL	Low Profile Grooved Rail Track For Light Rail Transport (LRT)	EU	
Project website www3.eureka.be/ifs/files/ifs/jsp-bin/eureka/ifs/jsps/projectForm.jsp?enumber=2489			
OPTITRAC	Optimization and diagnostics of condition of the tractive accumulator as an ecological source of electric power	EU	
Project website www.eureka.be/ifs/files/ifs/jsp-bin/eureka/ifs/jsps/projectForm.jsp?enumber=2518			
POLYS	Reinforced track structure with a use of modified Y-shaped steel sleeper	EU	
Project website (or contact) none			

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PROMAIN — Progress in Maintenance and Management of Railway Infrastructure — EU — Safety and interoperability

Key findings

The Thematic Network ProM@in has managed to enhance the performance of railway through the application of innovative knowledge, tools and methodologies. ProM@in has achieved to:

- establish co-operation between users and parties who can provide solutions;
- make available the results of research and technological developments;
- investigate and apply better construction principles, management and safety approaches;
- identify needs for further actions in Europe relevant to railways;
- collect and disseminate knowledge about highly performant slab tracks and
- study these systems' advantages and disadvantages.

Prom@in has published its own journal 'Innovations for Railway Track' in three editions presenting several aspects of railway. The team came to the following conclusions:

- quality management is not in the centre of Infrastructure Managers' interest;
- European rail freight has bad communication across borders;
- potential of Life-Cycle-Costing for cost reduction is not exploited;
- outsourcing needs specific tailoring.

Policy implications

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. Seven tasks have been defined with regard to their impact on the implementation of the three major policy principles and their different logical consequences. All tasks envisage the preparation of a field for future R & D activities which as such is itself a contribution to policy initiation. To get access to valuable knowledge sources and to receive support for the implementation of results, ProMain has established contacts to policy makers up to the level of the European Commission.

Project contact

hak@iitb.fhg.de

RAILPLAN — Development of software for railway planning — EU

Project website

www.eureka.be/ifs/files/ifs/jsp-bin/eureka/ifs/jsps/projectForm.jsp?enumber=1076

REOST — Railway electro optical system for safe transportation — EU

Project website

www.reost.com

Theme: **Rail Transport**			Last update: **17 August 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			

ROLLING SHELF Rolling shelf EU Planning and development of rail freight

Key findings

- Existing rail mode share for palletised cargo is, on average, less than 20%;
- There is a healthy potential market for the Rolling Shelf concept focusing on palletised goods and parcels on short distances, both segments estimated to grow at about 75% by the year 2015;
- Design of a network of 53 terminal locations for central European countries (B, NL, D, A, CH, I) and simulation of the trains required to serve the network;
- Design of new types of pallet, and of wagons able to accommodate the new pallets and travel at high speeds of up to 160 km/h;
- Development of conceptual terminal designs, ranging from manual handling of loading and unloading to fully automated systems;
- Economic assessment, based on a modelled pilot corridor Amsterdam – Milan, which gave favourable results for small consignments over short distances (100-200 km) at train utilisations of 50% and above;

Policy implications

Several branches of findings from the Rolling Shelf project will be followed up by further initiatives, such as FP 5 projects CO-ACT on fast cargo train test trials, handling nodes and networks, and New Rail Wagon on the design and manufacture of prototypes of advanced freight wagons. Several projects on EU and national level are under way to evaluate the benefits of e.g. time table driven rail transport on major European links or the development of fast cargo terminal networks. Moreover, the operation of future rail freight networks and the provision of vehicles and infrastructures are investigated in current projects.

Project contact

hans.unseld@evecosoftware.com

SAFET Safety in tunnels Thematic Network EU Safety and interoperability

Key findings

The SAFET thematic network has:

- Developed a global, though flexible and non-restrictive approach to tunnel safety incorporating both performance based and prescriptive approaches; and
- Produced Best Practice European Guidelines covering:
  - the current state of practice,
  - accident and incident detection and traffic management,
  - evacuation intervention management,
  - post accident investigation and evaluation,
  - harmonised risk assessment, and
  - integrated tunnel safety management systems.

Policy implications

Over a five year period, a total of seven research projects including SAFET have investigated the possibilities to prevent accidents and incidents by holistic approaches to tunnel safety, and secondly to mitigate the impacts of accidents and incidents involving fire by improving tunnel infrastructures and safety systems. The best practice guidelines released by SAFET are in line with the revision of design guidelines for tunnels in several countries, namely Austria, France, Germany and Switzerland prompted by some 10 severe fire accidents in road and rail tunnels. Findings from the SAFET thematic network are primarily relevant for road tunnels whereas rail tunnels are only partially covered.

Theme: **Rail Transport**			Last update: **17 August 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			

Project contact

safet@mep.tno.nl

SAMNET | Safety management and interoperability Thematic Network | EU | Safety and interoperability

Key findings

The SAMNET thematic network has:

- Identified the implementation issues from the Railway Safety Directive and proposed solutions through organising working groups, workshops on individual topics and for individual railways seeking opinions from experts, and case studies to check if the suggested approaches (common safety targets, safety management system, cross acceptance, etc.) are workable;
- investigated the relationship and dependencies between Interoperability and Safety Directives; and
- set up four working groups comprised of all relevant stakeholders from industry, assessors and notified bodies, infrastructure operators, and railway associations.

Policy implications

SAMRAIL has identified the main areas of further research as part of a strategy plan to implement the Railway Safety Directive:

- Railway risk control (cost-benefit analysis);
- common contents and formats of accident and incident statistics and investigations;
- audit and review: performance indicators for the Safety Management System (SMS);
- elaboration of a comprehensive and consistent safety database; and
- operational aspects of interoperability.

Project contact

el-miloudi.el-koursi@inrets.fr

SISMODCOM-PROT | A modern system of commutation and protection of the electrical power lines in the railway transport in view of alignment to the requirements of the European system | RO | Safety and interoperability

Key findings

The main objective of the project was to design and implement modern equipment, using the best commutation method, i.e. in vacuum commutation, which presents technical characteristics compliant at European level. Among the key results relevant to the theme, the following can be mentioned:

- Establish the technical solution for the separation system (SS) 27.5 kV - 630A;
- Design the experimental model for (SS). Elaborate references - draft I;
- Experimental model for (SS) and experiments on the models;
- Design prototypes of the supply system (SA) 27.5 kV - 1250A-12.5kA and of the separation system (SS). Elaborate references - draft II;
- Execute prototypes for (SA) and (SS), type tests according to the product Technical Specification (TS), together with development of test reports and certification of prototypes (SA) and (SS);
- Design zero series (SA) and (SS), execute zero series (SA) and (SS), type tests according to the product TS, together with development of test reports and certification of the zero series for (SA) and (SS).
- The final result is the certification of the zero series for both systems.

Further on, the series production can proceed within the Energetical Research & Design Institute - ICPE

Theme: **Rail Transport**			Last update: **17 August 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			

S.A. without other investments for preparing the manufacture line. For monitoring the operation of the products during the exploitation, it was agreed with the National Railway Company that an interrupter of 27.5 kV - 1250A be delivered and installed free of charge within the supply system of the latter, in order to enable the participation in the tendering process of 2006, when it is estimated that a number of 40 interrupters will be contracted.

Policy implications

The implementation of the Project created a sound basis for designing and executing modern equipments using the most recent commutation method, i.e. vacuum commutation, including technical characteristics of European level.

Project contact

apel2@icpe.ro

TRAINCOM	Integrated Communication System for Intelligent Train Applications	EU	

Project website

www.traincom.org

TRAPOLO	Train Position Locator For Electric Railways	EU	

Project website

www.eureka.be/ifs/files/ifs/jsp-bin/eureka/ifs/jsps/projectForm.jsp?enumber=2257

UPTUN	Cost-effective, sustainable and innovative upgrading methods for fire safety in existing tunnels	EU	

Project website

www.uptun.net

URBOS	Modern Tramway Of Lightweight Construction With Emphasis On Low-Cost, Low Transmitted Noise And Vibration Levels	EU	

Project website

www.eureka.be/ifs/files/ifs/jsp-bin/eureka/ifs/jsps/projectForm.jsp?enumber=1552

–	Passenger Rail Services and Economic Performance	UK	Planning and development of passenger rail systems

Key findings

This study has identified four broad areas of harm resulting from poor rail performance:

- Direct harm to business travellers and business - estimates from the desktop study suggest that business travellers incur approximately £1 billion of disutility per annum due to poor rail performance, which is equivalent to nearly £6.80 per single journey. Significant numbers of non-travellers (secondary impact) may also be adversely affected by delayed business travel, potentially raising the damage estimate.

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- Indirect harm to business - evidence from the literature review suggests that employees' productivity is reduced by around 13-18% after undertaking an unreliable and congested journey. However, it is unclear how long this reduction in productivity lasts. The literature review also suggested that difficulty travelling to work reduced job satisfaction, potentially raising staff turnover, and increased absences due to illness.
- Harm to commuters - evidence from the literature review indicates that unreliable and congested travelling conditions can double the observed stress levels among travellers. The desktop study estimates that commuters incur approximately £500m of disutility per annum due to lateness and unreliability.
- Harm to leisure travel and tourism - the desktop study estimates that leisure travellers incur around £650m of disutility per annum due to poor rail performance. The disutility caused by poor rail performance may be as high as 10% of average tourist expenditure on trips within the UK.

Policy implications

Overall, the evidence from this study shows that poor rail performance has a significant impact on individuals, the economy, and society in general. The estimate for total disutility (relative to an ideal world of zero delays) is equal to around £2.2-£2.5 billion per annum, which is approximately equal to two-thirds of the total annual ticket sales of the railway. Arguably, this is a conservative estimate, as it does not include some external effects, such as the effect on business meetings. Consequently, improvements in rail performance have a significant value attached to them. For example, if each train operator were to reproduce its best year of performance, total disutility, as calculated by the OXERA model, is likely to fall by around £900m per annum.

Project contact

rail@dft.gsi.gov.uk

–	Rail sector framework and tools for standardising and improving usability of Environmental Performance Indicators and Data formats	EU	

Project contact

bergendorff@uic.asso.fr

–	Road to rail	UK	Planning and development of rail freight

Key findings

This commercial sector case study shows how the logistics provider TDG has worked with BP chemicals to tailor a specific road to rail freight transport service with the re-opening of a disused national rail link in the form of the open- access Grangemouth terminal. The case study examines the development of the facility from its inception through to current examples of usage, identifying the following areas of thematic relevance such as:

- The application of intermodal modelling and planning, specifically in relation to the road rail sea linked location of this terminal;
- handling and intermodal transport equipment, such as siding capacity or warehouse and decanting facilities;
- quality of transport networks extending across both the UK and mainland Europe via the channel tunnel or ferry; and
- terminal and transfer point efficiency.

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Policy implications

This is a Case Study of good practice in the commercial sector, promoting intermodal freight transport. As a direct result of this initiative, it is predicted that 360,000 tonnes of bulk traffic will be transferred to rail in 2006. Without the new terminal 14,500 truck round-trips would have to be performed, totalling 5.9 million miles a year and using 3.35 million litres of diesel fuel. This quantity of fuel, if used, would have generated 8.85 million kilograms of carbon dioxide. Another advantage of the Grangemouth facility is that any rail company or any road operator can use it. This open access allows TDG to market the service to other customers, encouraging them to use the terminal as part of their transport operations.

Project contact

janet.lynn@aeat.co.uk

–	Strengthening of the competitive environment of rail passenger transport	SK	Competition and industrial organisation

Key findings

The main results related to the rail theme include:

- Concept for the adaptation of the legislation of the Slovak Republic to provide simplified access of the different operators of railway lines and changes in connection with financing of regional passenger transport, with shifting of competences for the provision of the regional transport services;
- Concept of measures for strengthening of the competitiveness of rail passenger transport in relation to other public passenger transport means including the integration of the passenger transport systems;
- Identification of the requirements of the enterprises of the transport market, of the economic strategy of the State and the economic tools;
- Restructuring of the competences of the key authorities of the State in the transport sector.

Policy implications

Policy implications and recommendations are, among others, the following:

- Sustainability of the individual elements of the network of long-distance public transport in the SR;
- Provision of main transport connections between the Slovak Republic and the states of Central Europe;
- Provision of integrated instruments of intelligent transport systems (ITS).

Project contact

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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.

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.

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
D2.E	**"Third annual thematic research summary"; 28 vol.**	**August 2006**

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).

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 Dreveton, ISIS; France
Mr Dreveton 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

Wolfgang Helmreich, Industrieanlagen-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 I 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, Industrieanlagen-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

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 transhipment 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

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*

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