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TRANSPORT TRENDS AND ECONOMICS

Studies on transport economics and track costs
undertaken by other organizations

Addendum 1

Transmitted by the European Commission (EC)

Note: This paper summarizes information provided by the Directorate General for Energy and Transport (DG TREN) of the European Commission.

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The Directorate General for Energy and Transport administers a number of transport studies involving an economic dimension of transport. The majority of them are carried out within the Framework Transport Research programme of the EC. The fifth Framework Research Programme, which at the time when this information was made available, is being established, and it will contain a number of research projects related to economic aspects of transport.

Below are listed summary details of projects within the 5th Framework Programme on Transport Economics:

Forecasting demand

EXPEDITE – Expert-system based Predictions of demand for Internal Transport in Europe

Description: The aim is to utilise and extend existing expert-system based models to provide comprehensive travel demand forecasts for all distance bands, and to provide for future year forecasts and a statement on core and competitive demand submarkets. EXPEDITE will operate interactively with the THINK-UP Thematic Network.
Related transport policy: Community (common) transport policy. Policy for Trans-European Networks. Input to continued research and as background to back up transport and related policy decisions.
Expected Output: Demand forecasts for years 2005, 2010, 2015 and 2020. Core and competitive components of modal forecasts.
Final report for publication: project still active
Web Site: http://www.hcg.nl/index.htm
Call: 1st Project end date: *October 2002*
Contact in DGTREN B1: Keith Keen +322 296 3469

THINK-UP – Thematic Network: Thematic Network for Understanding Mobility Patterns

Description: The basic aim is to establish a common platform of understanding for mobility predictions in Europe. Results and methodologies on transport prediction will be drawn together, and a continuing dialogue between all interested actors is expected to be achieved. THINK-UP will operate interactively with EXPEDITE.
Related transport policy: Community (common) transport policy. Input to continued research and as a background to back up transport and related policy decisions.
Expected output: Review of European modelling results as regards model specification (D11). Seminar and workshop conclusions. A productive network of European experts.
Final report for publication: in preparation
Web Site: http://www.its.leeds.ac.uk/projects/sprite
Call: 1st Project end date: July 2002
Contact in DGTREN B1: Keith Keen +322 296 3469

SPRITE: Separating the Intensity of Transport from Economic Growth

Description: The project will take an approach looking beyond the transport sector to identify innovative means of decoupling transport growth and economic development.
Related transport policy: Development of transport policy and implications for policies that have a bearing on transport and transport policy. Input to continuing research can be expected.
Expected output: Output will be an assessment of, and recommendations for, the most promising innovative means of decoupling.
Final report for publication: in preparation
Web Site: http://www.its.leeds.ac.uk/projects/sprite
Call: 1st Project end date: July 2001
Contact in DGTREN B1: Keith Keen +322 296 3469

Internal and external costs and pricing

UNITE: Unification of accounts and marginal costs for transport efficiency

Description: The objectives of the research are. (i) To build transport accounts that give a clear and transparent overview of the economic and financial flows of the transport system and of the individual nodes. (ii) To define efficient prices to be charged from the users in different local and traffic contexts (30 case studies) and (iii) to develop a methodology to integrate the information from the accounts and marginal cost case studies.
Related transport policy: Pricing
Expected output: Pilot transport accounts for EU 15 and Switzerland, Hungary and Estonia covering all modes. More that 30 case studies to estimate marginal costs for a range of traffic situations and geographical areas.
Final report for publication: project still active
Web Site: http://www.its.leeds.ac.uk/unite
Call: 1st Project end date: September 2002
Contact in DGTREN B1: Catharina Sikow +322 296 2125

IMPRINT - Europe: Implementing Pricing Reform in Transport – Effective Use of Research on Pricing in Europe

Task Description: IMPRINT-Europe will (i) bring together policy-makers, operators, researchers and other stakeholders in order to promote the implementation of fair and efficient transport prices; (ii) organise high profile, international seminars where the needs of policy-makers and the findings of research will be synthesised and debated; (iii) produce high quality reports summarising research and putting forward recommendations on how to implement the required pricing reforms.
Related transport policy: Pricing, Common transport policy.
Expected output: Five seminars with corresponding documentation and consensus seeking on: (i) acceptability of pricing reform in transport; (ii) best practice; (iii) constraints and solutions; and (iv) phasing and packaging.
Final report for publication: project still active
Web Site: http://www.imprint-eu.org/
Call: 2nd Project end date: June 2004
Contact in DGTREN B1: Catharina Sikow +322 296 2125

MC-ICAM - Marginal cost implementation

Task description: MC-ICAM aims at (i) defining *optimal* (*full, first-best*) *end states* in the short, medium and long term compared to the current situations – for all important passenger and freight modes, covering both urban and interurban issues, and taking account of relevant technological, institutional and national contexts. (ii) Determining the conceptual level the *necessary or optimal (second-best) implementation steps* – in terms of recommendations for actual pricing measures (policy packages) and for modal and geographical priorities. (iii) Carrying out in-depth *modal level (urban, interurban road, rail, air, water) analyses* of the current pricing and other regulatory issues, and of the barriers to the marginal cost pricing in different modes.
Related transport policy: Pricing, Common transport policy
Expected output: Implementation path covering all modes.
Final report for publication: project still active
Web Site:
Call: 2nd Project end date: January 2004
Contact in DGTREN B1: Catharina Sikow +322 296 2125

SPECTRUM – Study of Policies regarding Economic Instruments Complementing Transport Regulation and the Undertaking of Physical Measures

Task Description: The project will look at: (i) Provision of a theoretically sound framework for analysing the trade off between objectives and identifying optimal combinations of instruments to achieve them. (ii) Analysis and assessment of transport packages – providing quantified evidence on the use of alternative instruments in managing urban or inter-urban capacity and the likely practical impacts of different approaches. Evidence on how individual instruments fit in a policy and how their degree of intensity can be defined under various constraints. (iii) Generalisation – informing target users of the synthesised evidence and transferability of alternative transport management packages across the broader urban/inter-urban spectrum and their wider social impact. (iv) Guidance and recommendations – enabling policy makers to achieve a better balance between different, often conflicting objectives.
Related transport policy: Pricing, Common transport policy, TENs
Expected output: Assessment of and guidance on transport policy packages providing quantified evidence of using alternative instruments in managing urban or inter-urban capacity. Methodology for generalisation of lessons learnt from one context to another.
Final report for publication: project still active
Web Site:
Call: 3rd Project end date: January 2005
Contact in DGTREN B1: Catharina Sikow +322 296 2125

Task 2.1.3/10 Use of revenues from transport pricing

Task Description: The aim of the task is to examine options for the use of surplus revenues from the application of marginal cost based pricing in one mode or region for covering deficits arising in other modes or regions. The trade-offs between economic efficiency, public acceptability and equity as well as legal/institutional constraints will be looked at.
Related transport policy: Pricing and financing, TENs, Public-private partnerships, Common transport policy
Expected output: Solutions to combine pricing of the existing transport system and investments in transport infrastructure (Financing). Concrete suggestions of how to finance the fixed cost of a certain transport project in different modes with least distortions and adverse distributional effects, these could include e.g. access charges in the form of two-part tariffs, regional cross-subsidies, inter-modal cross-subsidies, etc.
Final report for publication: *when negotiated enter either "project still active" or "add web site location/printed report"' reference*
Web Site:
Call: 5th Project end date: *project to start 2002*
Contact in DGTREN B1: Catharina Sikow +322 296 2125

Policy and project assessment

TRANSTALK – Thematic Network on project and policy assessment methodologies

Description: The project will look at: (i) Provision of a theoretically sound framework for analysing the trade off between objectives and identifying optimal combinations of instruments to achieve them. (ii) Analysis and assessment of transport packages – providing quantified evidence on the use of alternative instruments in managing urban or inter-urban capacity and the likely practical impacts of different approaches. Evidence on how individual instruments fit in a policy and how their degree of intensity can be defined under various constraints. (iii) Generalisation – informing target users of the synthesised evidence and transferability of alternative transport management packages across the broader urban/inter-urban spectrum and their wider social impact. (iv) Guidance and recommendations – enabling policy makers to achieve a better balance between different, often conflicting objectives.
Related transport policy: Pricing, Common transport policy, TENs
Expected output: Best practice guidelines for evaluation. Identification of user needs and comparison with existing methods, identification of gaps and further research needs.
Final report for publication: project still active
Web Site: http://www.iccr-international.org/trans-talk/
Call: 1st Project end date: September 2001
Contact in DGTREN B1: Catharina Sikow +322 296 2125

IASON – Integrated Appraisal of Spatial economic and Network effects of transport investments and policies

Task Description: IASON is part of the Cluster on socio-economic impacts of transport investments and policies and network effects. Its goal is to improve the understanding of the impact of transportation policies on short- and long-term spatial development in the EU, such as regional economic development, accessibility, network effects, land use impacts. It will also develop a unified assessment framework for the European level, integrating the network, the regional economic and macro-economic impacts studied in IASON, TIPMAC and TransEcon projects.
Related transport policy: Trans European Networks policy and projects, pricing, Common transport policy
Expected output: Assessment of the direct and indirect impacts, including network effects and Community added value, of TENs and pricing policy at regional level. Rules for inclusion of indirect impacts in cost-benefit analysis.
Final report for publication: project still active
Web Site:
Call: 2nd Project end date: September 2003
Contact in DGTREN B1: Catharina Sikow +322 296 2125

TIPMAC – Transport infrastructure and Policy – MACroeconomic analysis for the EU

Task Description: TIPMAC is part of the Cluster on socio economic Impacts of transport investments and policies and network effects. Its aim is to study the interaction between transportation policies, in particular the TEN and pricing policies, and macro-economic impacts, such as GDP, employment, inflation, etc. using two parallel approaches.
Related transport policy: Trans European Networks policy and projects, Pricing, Common transport policy
Expected output: Assessment of macro-economic impacts of TENs and pricing policy at EU and national levels. Enhanced modelling and forecasting tools.
Final report for publication: project still active
Web Site:
Call: 2nd Project end date: September 2003
Contact in DGTREN B1: Catharina Sikow +322 296 2125

Task 2.1.2/5 – Economic, environmental and social conditions for sustainable development of transport

Task Description: The task aims at operationalising the concepts of sustainable development and sustainable mobility in the transport sector and to define policy measures to improve its sustainability. The project will do this by defining and determining indicators and threshold values for economic, environmental and social impacts of transport.
Related transport policy: Common transport policy, environmental policy, TENs
Expected output: Operational working concepts of sustainable mobility that can be used for transport policy and modal policy planning and definition.
Final report for publication: project still active
Web Site:
Call: 3rd Project end date: project to start 2002
Contact in DGTREN B1: Catharina Sikow +322 296 2125

Task 2.1.3/11 – Institutional issues in transport policy implementation

Task Description: The objective of the task is to develop a framework for the analysis of the decision-making processes and the different roles of decision-making governing bodies, cities and regions and other relevant organisations have in implementing transport policies and consequently in achieving a well functioning and efficient transport system.
Related transport policy: Common transport policy
Expected output: Better understanding of the implications and constraints of different organisational and regulatory settings and of the subsidiarity principle in reaching the objectives of transport policy.
Final report for publication: *when negotiated enter either "project still active" or "add web site location/printed report' reference*
Web Site:
Call: 5th Project end date: project to start 2002
Contact in DGTREN B1: Catharina Sikow +322 296 2125

INDICATORS Project

INDICATORS is a 12-month project commissioned by the European Commission (Directorate General for Transport and Energy) to the consortium of TRL (UK), DHV (NL), Dorsch Consult (D) and ISIS (FR). Its primary objective is to specify a consistent and permanent performance-monitoring mechanism to evaluate the Trans-European infrastructure and traffic, taking into account technical, institutional, legal and contractual aspects at the national and European level.

This performance monitoring framework would constitute an important basis for the European Commission and national European administrations for planning, funding, prioritising, and developing/upgrading the Trans-European transport network of the EU Member States and Candidate countries.

Performance indicators are those quantifiable measures used at Trans-European level to describe and measure the performance of strategic policy management, programme planning, resource funding, investment, tracking and monitoring of the Trans-European transport network for the various modes.

In compliance with the role of the EU and the Community guidelines and priorities for the development of the Trans-European network, the performance indicators serve in the following specific domains for strategic infrastructure planning and evaluation:

- **Transport policy formulation** (regulations and directives on market access, pricing, social rules, standards, etc.)
- **Network planning** (revision of the Trans-European guidelines)
- **Network monitoring** (monitoring the implementation of the TEN-T guidelines)
- **Funding projects programming** (programming EU funding from the various budget sources)
- **Funding projects selection** and monitoring

Operating and transport user perspectives are not part of the application context in this study. The performance indicators surveyed cover the following application contexts:

- **Sector**: Passenger, Freight
- **Mode**: Road, rail, Airports, Inland waterways, seaports; Inter-modal
- **Area**: National transport network and links forming part of the Trans-European transport network including networks for Candidate Countries for Accession.

The INDICATORS project is structured around five tasks:

1. Development of indicators to measure the performance of individual projects, corridors, infrastructure programmes or the network.
2. Detailed classification, assessment and selection of indicators
3. Assessment of the indicators' usefulness by means of case studies
4. Study of the operational and organisational aspects of the functioning and administration of the monitoring system including the DG-TREN GIS tool
5. Refinement of the list of indicators and final recommendations for the establishment of the monitoring system

In addition to research programmes presented above, a number of researches within the fourth framework programme for Community activities in the field of research, technological development and demonstration for the period 1994 to 1998 have been completed and their results made available in printed form or through the programme's Knowledge Centre Internet site at: http://europa.eu.int/comm/transport/extra/home.html

A short summary that follows presents the main features and outlines main conclusions of some of completed researches.

Getting prices right

Area of research: The aim of research of transport pricing has been to show that pricing reform is both practical and effective. The research has focused on six main issues:

(i) *How to put new charging concepts into practice* – Identifying strategies to implement the principle of marginal cost pricing in different contexts.
(ii) *How to estimate the monetary value of indirect costs* – Providing guidance on the quantification of impacts such as congestion, pollution, global warming, accidents and infrastructure wear and tear.
(iii) *How user costs could change* – Quantifying the increases and decreases in charges that would result from more efficient pricing.
(iv) *How travel behaviour could change* – Demonstrating and analysing the effects on transport demand, travel patterns and modal choice.
(v) *How to increase political and public acceptability* – Determining stakeholder views and the implications for successful introduction of new pricing schemes.
(vi) *How to relate pricing to financing* – Identifying ways of financing transport systems that bridge the gap between pricing at marginal cost and recovering total cost.

Key results:

(a) Near-optimal charges can be implemented in practice
(b) Charges can take account of congestion, pollution and accidents
(c) Pricing reform will benefit society as a whole
(d) New patterns of charging will change travel behaviour
(e) Pricing reform can be made acceptable
(f) Research results are informing policy

Future research in transport pricing is extending the theoretical foundation for the introduction of marginal cost pricing in the following areas:

- providing a forum for interaction between researchers and policy-makers;
- evaluating the costs of transport in different local and traffic contexts, and also at Member State level
- determining the socio-economic impacts of pricing policies and the effects on market competition
- practical implementation, such as the design and testing of pricing schemes and the phasing of the introduction of measures
- use of regulation and investment to complement or substitute for economic instruments.

European transport networks

Areas of research: research on trans-European transport networks has aimed at supporting the evaluation and implementation of the investment programme, including (i) development of tools and methodologies to assist the planning and funding of infrastructure, and (ii) demonstration of innovative technological and operational solutions for traffic management and intermodality. The main research lines are:

(i) *Interoperable European networks* – Identifying organisational strategies to improve interoperability, and developing innovative technologies for freight terminals and combined transport.

(ii) *Managing traffic and navigation* – assessing speed management systems for road transport, developing European systems for traffic management in air, rail and waterborne transport, and assessing the potential for Galileo.

(iii) *Evaluating trans-European networks* – Assessing regional and economic impacts and barriers to implementation, and developing strategic tools and methods for forecasting traffic and environmental impacts.

(iv) *Interconnecting multi-modal networks* – Identifying new solutions for freight terminal operations, seaport-hinterland connection and pre- and end-haulage.

(v) *Developing trans-European networks* – Assessing the potential of dedicated freight railway networks and inland waterways, providing guidelines on the implementation of public private partnership, and assessing alternative developments for pan-European corridors.

Key results:

(a) Harmonised approaches to traffic management are needed at a European level to improve interoperability and make more efficient use of the existing infrastructure in road, rail, and waterborne transport.

(b) System-wide and long-term effects need to be taken into account in the assessment of trans-European transport networks in addition to the immediate transport impacts.

(c) A pilot strategic environmental assessment carried out in the transport research. programme has provided the first comprehensive, quantified forecasts of the impacts of trans-European network policies and infrastructure on travel demand and emission at the EU level.

(d) Development of a European traffic management system, liberalisation of the rail sector and improved organisation of services are elements of the EU strategy to improve the competitive position of railways. A trans-European rail network dedicated to freight has been proposed and evaluated.

(e) Public-private partnership (PPP) can offer an attractive option for successful and accelerated implementation of trans-European network projects. Guidelines have been provided to assist in the decision-making process on the use of PPP to finance and operate such projects.

(f) Development of Pan-European corridors is a key step in the integration of the EU accession countries. In-depth assessment of transport markets within the broader socio-economic and political context is needed to aid prioritisation of infrastructure investments.

Future research: Clearing bottlenecks in railway networks and at airports, exploiting the potential of waterborne transport and connecting effectively the candidate countries are important future challenges. Priorities in current research include the following:

- Infrastructure development and maintenance – specifications for technical and administrative interoperability within and across modes, and optimisation of terminal operations;
- Traffic management systems – solutions for interoperable road traffic information and management systems, development of a supervisory railway management facility along European corridors, etc.;
- Decision support tools for infrastructure plans – enhancement of guidelines for SEA including specifications of indicators and data sets and calculation methods for transport environmental costs, and development of new methodologies for the assessment of indirect and distributional impacts of transport investment projects;

- Innovative transport services – assessment of the potential for rail-air freight services, and demonstration of operational solutions for European rail freight freeways.

Sustainable mobility

Areas of research: The aim of research on sustainable mobility has been to identify packages of measures that address multiple policy objectives in a balanced way. This has included (i) evaluating the typical impacts of measures, (ii) developing methods, databases and modelling tools to support the evaluation and implementation of policy, and (iii) identifying legislative and market barriers. The research has supported policy in six main areas:

(i) *Understanding the future* – Developing scenarios and forecasts of the future context in which transport policies must operate, and providing data on the current situation;
(ii) *Increasing economic performance* – Identifying strategies to ensure good accessibility and improve the competitiveness of individual modes and multi-modal services;
(iii) *Improving social conditions* – Promoting the equitable treatment of regions and citizens, and providing advice on changes that will affect working conditions;
(iv) *Protecting the environment* – Developing tools for environmental management and regulatory control;
(v) *Building transport strategies* – Evaluating the contribution of pricing, traffic management, land-use planning and other measures to an overall strategy for transport;
(vi) *Balancing policy packages* – Developing evaluation methods to help policy-makers deal with conflicting objectives and the trade-offs between impacts.

Key results:

(a) Baseline forecast for transport in Europe – To provide a consistent basis for policy-making, a "reference scenario" has been produced for the European transport sector through to the year 2020. This is based on projection of current trends. Building on this, software models have been developed for forecasting transport demand and traffic flows, allowing the effects of policy options and alternative socio-economic scenarios to be tested.
(b) Regulation for environmental protection – Research has evaluated a range of abatement options, such as new take-off and approach procedures to reduce noise at European airports, regulatory controls on waste management in the maritime sector, and certification of aircraft and rail vehicles. In addition, measurement and modelling tools have been developed to support the policy process.
(c) Pricing to manage transport demand – Practical guidelines and calculation methods have been devised to support the introduction of measures such as road pricing. In addition, public acceptance and behavioural reactions have been tested through surveys and small-scale demonstrations.
(d) European transport policy information system – The transport research programme has devised new methods for data collection and estimation, as well as defining s system for data sharing across Member States.

Future research: Building on research that has shown how to build integrated strategies for sustainable mobility, seeking the balance between different policy objectives, the current research is moving in a number of directions:

- Support for policy implementation, for instance concerning noise abatement and vehicle

environmental labelling;
- In-depth assessment of selected policy options with high potential, such as reform of pricing;
- Development of solutions to meet emerging issues, such as the health risk now being attributed to ultra-fine particulate emissions from engines;
- Further progress towards practical tools for policy support, particularly aimed at taking account of wider socio economic impacts.

Freight intermodality

Areas of research: The main aim of research on freight intermodality has been to find solutions to those problems impeding the further growth of integrated freight transport. These problems arise in two main areas: quality of transport networks and quality of terminals/transfer points. The research has supported four main strands of policy development:

(i) *Removing barriers and reducing costs* – Identifying barriers and opportunities that operators face in using intermodal transport, and devising strategies to minimise costs of modal transfers;
(ii) *Exploiting information and communication* – Developing the opportunities offered by information and communication technologies as the key to seamless intermodal transport;
(iii) *Facilitating efficient operations* – Promoting European-level cooperation between infrastructure planners and decision makers on a cross-modal basis in order to provide a coherent and efficient infrastructure of networks and terminals; and facilitating integration between modes through standardisation and harmonisation activities;
(iv) *Introducing new concepts for city distribution* – Developing frameworks and concepts for freight interchanges on the urban periphery, aimed at reducing inner city congestion and pollution.

Key results:

(a) A seamless information chain – The transport research programme has pioneered a promising new approach in making intermodal transport more attractive by harmonising information exchange processes.
(b) Efficient rail freight – Main criticisms of the quality of international rail transport include poor flexibility and reliability, a lack of coordination between operators, inadequate information, high costs, inconsistent pricing policies, and a failure to cooperate in exploiting logistical systems. Research has evaluated a radical strategy aimed at overcoming these deficiencies.
(c) Integration of new telematic technologies –Research has identified the most promising technologies and solutions to cope with increasing demand, and to make the intermodal option a competitive alternative to road transport by improving terminal management and integrating existing telematics systems.

Future research: While research to date has centred on the improvement of technical, logistical and legal elements of the integrated transport chain, the focus of research in ongoing projects has shifted to an even more integrated approach. Six main areas have been targeted:

- Meeting the targets for sustainable development and climate change;
- Understanding new trends and changes;
- New intermodal technologies;

- New container concepts;
- Infrastructure aspects in Central and Eastern European countries;
- The use of intelligent transport systems.

Road safety

Areas of research: Improving road safety is one of the key issues within the Common Transport policy, and four main approaches can be identified: road infrastructure design and redesign; vehicle design; traffic signing and control; and influencing driver behaviour. The transport research programme is supporting policy development in four main areas:

(i) *Improving road user safety* – Promoting appropriate behaviour by road users through legislation, awareness campaigns, driver testing, training, better human-machine interfaces and enforcement;

(ii) *Introducing safer vehicles* – Enabling the extensive use of telematics and in-vehicle assistance systems, and developing, testing and demonstrating new design philosophies and components;

(iii) *Improving road infrastructure safety* – developing and demonstrating components, measures and methods (including telematics) to increase the safety of the infrastructure elements of road transport;

(iv) *Establishing statistical databases and assessments* – Setting up and maintaining a unified statistical database for accidents, and developing methodologies for risk analysis and assessment of safety impacts.

Key results:

(a) Enforcement of traffic rules – The Commission plans to take initiatives against dangerous driving aimed at all motorists, as part of the Community's justice policy. It has been estimated that if all cost-effective enforcement strategies were to be applied, then 50% of deaths and serious injuries could be reduced. Research has been active in devising the means to support enforcement.

(b) Driver behaviour – Ongoing research is targeting the groups with the highest inherent risk – young and novice drivers (responsible for 15% of all accidents), elderly drivers and mobility-restrained people. One aspect is the improvement of training, while another is the simulation of the vehicle environment and its effects on the safety-critical responses of a variety of drivers.

(c) Passive safety – Assessment of the actual performance of vehicles in terms of protection against frontal impacts is still carried out using crash test dummies. Conventional dummies face some limitations for injury assessment, so research has been initiated into the use of newly developed crash test dummies within standard test procedures.

Future research: The move towards sustainability, the new information society and emerging new boundary conditions have led to the following main areas of research being accorded priority:

- The development of improved vehicle safety standards and testing procedures for road vehicles (e.g. improved crash compatibility between road vehicles; improved protection in side impacts; prevention of "whiplash" injuries; measures to improve motorcycle leg and upper torso protection);
- Improved road infrastructure design and redesign;

- The role of impairment in road safety (use of illicit drugs and prescribed medicines; fatigue; rehabilitation programmes);
- Research and development on standards for information technologies such as: intelligent speed adaptation; acceptability of new enforcement technologies; and, in-vehicle human-machine interfaces;
- Cost/benefit analysis methodology;
- In-depth accident research;
- Demonstration projects.

Intelligent transport systems

Areas of research: Research into ITS has had two main concerns: investigating the merits of introducing new technologies, and identifying and piloting developments that are necessary for ITS implementation and regulation. The main research lines are listed below:

(i) *Infrastructure and common services* – assessing new technologies against policy criteria, particularly satellite navigation and positioning systems (Galileo).

(ii) *Information systems for European transport* – Developing the means of establishing databases and information systems to support planning and policy-making at the EU level.

(iii) *Intermodality for travellers* – Demonstrating and evaluating urban traffic management systems, urban road pricing, and telematics for transport in rural areas.

(iv) *Road transport* – Identifying the potential to improve road safety and efficient traffic management using advanced telematics, such as traffic control systems and variable message signs.

(v) *Rail transport* – Specifying and testing the control and telecommunications systems of the European rail traffic management system (ERTMS), and evaluating the use of advanced technologies in rail transport.

(vi) *Air transport* – Specifying and evaluating aspects of the European air traffic management system, defining the validation process, and assisting the development of airport surface movement guidance and control systems (A-SMGCS).

(vii) *Intermodality for freight transport* – Developing information systems for the intermodal transport chain, terminal operations and urban freight distribution.

(viii) *Maritime transport and inland waterways* – Developing and demonstrating advanced solutions for river information services, vessel traffic management and integrated ship control centres.

(ix) *Managing ITS innovation* – Assessing new technologies for their effects on the working environment, institutional responsibilities and training needs.

Key results:

(a) Policy assessment of satellite navigation and positioning systems (Galileo) – Research has shown that Galileo will be economically beneficial for end users in Europe. Preferred options have been identified for involving public-private partnerships in the design, building and operating of Galileo.

(b) Integrated urban traffic management – Field tests have provided evidence of the benefits of using advanced systems in an integrated way.

(c) European radio communication system (GSM-R) for train control – GSM-R is the new European standard for railway communication technology, supporting a diversity of uses ranging from operational communications to safety-related control systems. It will make a

significant contribution to the overall interoperability of European railway networks.

(d) Operational concept and validation platform for the European air traffic management (ATM) system – Major research has been directed towards preparations for the European ATM system, including integration of systems, technologies and operational approaches, preparing validation activities, and evaluating improvements in capacity, safety and costs.

(e) Creating e-markets in intermodal freight transport – The development of standardised solutions for electronic data interchange (EDI) and other methods of information transfer.

(f) Efficient short sea shipping and inland waterway traffic management – Vessel traffic management and information services (VTMIS) and river information services (RIS) are the European ITS concepts that will support maritime and inland waterway traffic and the associated multi-modal transport logistics.

Future research: The emphasis in the development of ITS is to use technologies to integrate the operation and management of transport and logistic systems across organisations and modes. Priorities and current research lines include:

- Strategic information and evaluation systems;
- Satellite navigation and positioning systems (Galileo);
- Safety, security and human factors;
- Advanced traffic management systems;
- Transport and mobility services;
- Improving quality in shipping;
- Validation of airport surface movement guidance and control;
- Intermodal freight information services.
