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EXTR@Web Project

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Abbreviations and Acronyms Used

AG	High level Advisory Group (to the EXTR@Web project)
BG	Benchmark Group (associated with the EXTR@Web project)
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 **Integration** theme, 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 **66** projects deal partly or fully with the issues of **Integration**.

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 **Integration** 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

Within this theme, **integration** refers to the strategic integration of different policy instruments to achieve improved performance of the transport system.

Strategic integration can involve the coordinated planning of several modes so that each contributes more effectively. It can involve the combination of different measures under the dimension of 'tools', including infrastructure, management, regulation and pricing. It can also involve integration between transport and land use policies. The research emphasis is on how best to achieve benefits from such integration, either by increasing the benefits or by overcoming barriers to the implementation of any measure. A distinction is made between strategic integration and the operational integration of different modes for freight or passenger transport. The latter are covered under intermodal transport.

Integration is closely related to the term **interoperability** which describes the degree of harmonisation of two or more systems or sub-systems to work together. At a European level, integration/interoperability is the ability of national and geographically defined transport networks to provide efficient operations and services across national borders and across technical, physical, geographical, legislative, organisational and socio-economic barriers. For example, interoperability occurs when the rolling stock of a national railway company is able to operate on the whole of the trans-European railway network.

2.2 Topics included in theme

The topics within the theme of integration/interoperability are concerned with:
- Policy features;
- infrastructure features;
- operational features;
- organisational features; and
- information technologies.

In case of freight transport, there are four major **dimensions** of integration/interoperability:
- Technical interoperability concerns links between different transport systems through similar and compatible technologies;
- corporate interoperability, which occurs when different organisations are willing and able to co-operate to provide transport services for users;
- juridical interoperability, concerning the impediments to interoperability, such as different Directives by the Member States, which are removed or harmonised; and
- cultural interoperability, which occurs when the impact of different social factors such as linguistic or cultural barriers are reduced.

The three **levels** of integration/interoperability can be categorised concerning the different transport modes and markets:

- The horizontal level is defined as the interoperability within individual transport markets (e.g. operations, telematics, or infrastructure);
- the vertical level is defined as the interoperability between different markets (e. g. between infrastructure and operations); and
- the multi-modal level is defined as interoperability among the different modes of a transport system.

Three main **scales** of integration/interoperability are the following:

- The sector scale includes the interoperability between companies using the same mode in the same or different countries;
- the company scale, which examines the interoperability which individual companies experience; and
- the European scale concerns the interoperability between companies in different European countries and using different modes.

2.3 Significance of theme

Integration means to have in mind to co-ordinate the different demands of different clients. In intermodal transport it does not only mean the demands of shipper, road haulier, consignee and the intermodal operator, but also different demands of e. g. consignees or shippers. More and more producing companies have changed their philosophies from "just-in-time" to "just-on-demand" or "just-in-sequence", i.e., the goods not only have to be available when they are needed, but they have to arrive just when they are needed. As production plans differ and one intermodal train cannot serve all demands of shippers and consignees, integration of product plans to the time table of the train is needed by an intermodal freight integrator in order promote the use of this environmental-friendly transport mode.
On the other hand, integration is also needed to overcome the missing interoperability as integration does not mean that one partner transfers his technique to the other partners, but to consider the demands and (financial) possibilities of all partners.

Interoperability – or better: the not as yet realised interoperability – is a main problem for freight transport in Europe, namely in railway freight and passenger transport. E.g., in the EU five electric railway systems are in use, 11 different signalling und security systems, several different track gauges, a lot of different loading gauges, and in the UK another system of railway brakes is in use as on the continent.
While passenger and freight wagons can be used in nearly all European countries in a free way, only few locomotives can change from one national network to another, as these locomotives must be equipped with several electrical and security systems.

3. Policy context

The area of Integration is an important issue in European policy concerning freight and passenger transport. It is closely related to the theme of Intermodality. As described in the White Paper 'European transport policy for 2010: time to decide' [6], technological research has produced many innovations in logistics concepts and systems. Many, however, have never got beyond the drawing-board or prototype stage, because all too often they have focused on just a single link in the intermodal chain. From now on it is imperative to target research and development on the integration and consistent validation of the most innovative concepts and systems. The critical technologies developed for vehicles and transhipment equipment, for communications and for management must be tested in real conditions, with technical coordination.

Intermodality is of fundamental importance for developing competitive alternatives to road transport. There have been few tangible achievements, apart from a few major ports with good rail or canal links. Action must therefore be taken to ensure fuller integration of the modes offering considerable potential transport capacity as links in an efficiently managed transport chain joining up all the individual services. The priorities must be technical harmonisation and interoperability between systems, particularly for containers. In addition, the Community support programme ‘Marco Polo’ targeted on innovative initiatives, particularly to promote sea motorways and short-sea shipping, will aim at making intermodality more than just a simple slogan and at turning it into a competitive, economically viable reality. Experience has shown that especially short-sea shipping requires efficient, integrated commercial services. Thought should be given to bringing together all the links in the logistics chain (consignors, ship-owners and any others involved in the shipping industry, plus road, rail and inland waterway operators) in a one-stop shop to make intermodal transport by sea and inland waterway as reliable, flexible and easy to use as road transport.

By 2008 the entire European international freight network will have been opened up completely, thanks, in particular, to the determination of the European Parliament. The arrival of new railway companies from other backgrounds, with solid experience of logistics and intermodal integration, must make this sector more competitive and encourage the national companies to restructure while also taking social issues and working conditions into account. Research and development must help with the design and introduction of a framework guaranteeing full interoperability between rail infrastructures, vehicles, cabs and crews. It will focus on technologies which will help improve the capacity of means of transport and traffic management systems (longer trains, optimal allocation of slots, maintenance procedures) and introduce more competitive services (operating systems such as freight tracking, crew training). Priority must be given to funding infrastructure that eliminates bottlenecks, particularly at the frontiers, and modernises the railway network. In addition to restoring or building infrastructure, it is essential to connect it to the current trans-European transport network **Error! Reference source not found.**.

For goods transport, making the right use of the most efficient mode in the transport chain, based on different criteria at any given time, is the job of transport flow ‘organisers’, and a new profession is emerging: that of freight integrator. Modelled on what has been done at world level for package distribution, a new profession specialising in the integrated transport of full loads (exceeding around 5 tonnes) should emerge. These ‘freight integrators’ need to be able to combine the specific strengths of each mode at European and world level to offer their clients and, consequently, society at large the best service in terms of efficiency, price and environmental impact in the broadest sense.

As far as passenger transport is concerned, the increasing distances between centres at opposite ends of the Union as it enlarges mean that an effective high-speed passenger network is required. Such a network comprises the high-speed lines, including upgraded lines, connections and systems which will allow the integration of air and rail transport services and airports. To facilitate transfers of passengers from one network or mode to another, encouragement needs to be given to the introduction of ticketing systems which are integrated (and thus ensure transparency of fares) between rail companies or between modes of transport.

The Fifth Frame Programme (FP5) of the European Community (EC) for research, technological development and demonstration activities that runs from 1998 to 2002 is based on a more consistent and focused research to increase impact. The main aim is to help solving problems and to react on major socio-economic challenges facing Europe. To strengthen its effect, the FP5 focuses on a limited number of research areas combining technological, industrial, economic, social and cultural aspects.

The FP5 consists of two different parts: the EC Framework Programme containing research, technological development and demonstration activities, and the Euratom Framework Programme covering research and training activities in the nuclear sector.
The EC framework programme is based on four Thematic Programmes:

- Quality of life and management of living resources;
- user-friendly information society;
- competitive and sustainable growth; and
- energy, environment and sustainable development;

and three Horizontal Programmes:

- Confirming the international role of Community research;
- promotion of innovation and encouragement of participation of SMEs; and
- improving human research potential and the socio-economic knowledge base.

A major innovation of the FP5 is the concept of “Key Actions” that are implemented within each of the four thematic programmes. Research in respect of transport is mainly funded or co-funded and commissioned by the four Directorate-Generals for “Energy and Transport” (DG TREN), “Research” (DG RESEARCH), “Environment” (DG ENVIRONMENT) and “Information Society” (DG INFSO).

Specific coordination activities among the Key Actions and with other EU programmes outside the FP5 are planned. These EU programmes not related to FP5 cover more specific research themes like in the maritime or automotive area, or the coordination of nationally funded research. In this context especially the following programmes should be mentioned:

- COST Transport, which is an intergovernmental framework for European Cooperation in the field of Scientific and Technical Research, enabling the coordination of nationally funded research on a European level. Currently, more than 200 actions with 35 participating countries are involved. COST actions cover basic and pre-competitive research as well as activities of public utility.
- Marco Polo, as already mentioned, with the main aim to reduce road congestion and to improve the environmental performance of the freight transport system within the Community and to foster intermodality, thereby contributing to an efficient and sustainable transport system.
- Interreg III, which is a Community initiative that aims to stimulate interregional cooperation in the EU between 2000 and 2006.
- The pan-European network Eureka for market-oriented, industrial R&D. This network supports the competitiveness of European companies through international collaboration, in creating links and networks of innovation. The main aim is to bring high quality

research and development efforts to the market and to use the multiplying effects of cooperation and to advance and improve the quality of life.

4. Synthesis of findings from completed projects

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

- Policy features;
- infrastructure features;
- operational features;
- organisational features; and
- information technologies.

The majority of projects in the area of Integration analysed so far are attached to the Thematic Programme "Competitive and sustainable growth" (GROWTH programme) of the European Commission, namely in the Key Actions "Sustainable mobility and intermodality" and "Land transport and marine technologies". In addition, some projects are related to the Eureka pan-European Network, single projects to the Community Initiative Interreg III (Strand B – Alpine Space), to the COST Transport European Framework and to the Thematic Programme "User-friendly information society" (IST Programme).

Regarding the analysed projects included in the pan-European Network Eureka all of them belong to the umbrella action LOGCHAIN, which has the objective to improve international freight transport within Europe through the development and optimisation of continuous logistic chains between shipper and receiver. The main political aim of LOGCHAIN is to shift freight traffic from Europe's roads and highways to rail and waterways.

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

- D2.E-2.6 Intermodal transport;
- D2.E-4.3 Infrastructure provision; and
- D2.E-4.10 Vehicle technology.

Results from the following **25** projects have been included in this Thematic Research Summary:

Research sub-theme	Contributing projects
Policy Features	BAHN.VILLE; COST 339; CROSSRAIL; INHOTRA; INTERCEPT; LOGICAT; ONESKY; UG370; Integration of multi-modal reliability in the assessment of transport schemes (STP 14/6/12)
Infrastructure Features	ALPENCORS; CROSSRAIL; ONESKY; UG220; An integrated instrument for the environmental evaluation of local traffic plans; Inland navigation and sustainable development: analysis of factors that increase its market RDA; Integrated public transport; Measuring demand for an integrated inter-urban public transport network

Research sub-theme	Contributing projects
	(STP 14/6/16); TSE outward facing research: managing integration
Operational Features	ASSAP ONE; EDIP; IDIOMA; IN.HO.TRA
Organisational Features	ASSAP ONE; INTEGRATION; INTERCEPT; IP
Information Technologies	D2D; EDIP; ESCUGIBRI; IDIOMA; INTEGRATION; IP

4.1 Policy features

Policy-related topics include:

- The development of unified evaluation schemes/ assessment methods;
- the agreement on frameworks for action;
- the promotion of consensus formation among decision makers, for cross-border transport as well as for local/regional transport according to the aim of the Citizens' Network;
- the provision of legal boundary conditions for the introduction of new technologies and procedures for interoperability;
- the promotion of technical harmonisation and create unified standards and certification schemes for technologies and procedures for interoperability;
- the improvement of the preconditions for interoperability infrastructure, including new infrastructure construction;
- the promotion of spatial co-ordination; and
- the installation of interaction processes between decision-makers and decision-takers.

4.1.1 Research objectives

The research objectives in the area of policy features are targeted on the following items to:

- Contribute to the reduction of the environmental impact of traffic by promoting more environmentally friendly transport in urban areas, the reduction of road-traffic congestion and the improvement of the quality of city centres;
- contribute to the development and promotion of user-friendly public transport solutions by creating standards that can be used in cities in several countries;
- validate innovative horizontal transhipment technologies, their interoperability and the possibilities to integrate them into current intermodal transport operations, in order to make intermodal transport more effective, more competitive and to decrease the economic break-even distance of intermodal transport;
- collect information on existing and new RTD Projects in the areas of logistics, supply chain management and their relation with integrated intermodal systems in order to raise awareness and promote supply chain management;
- identify future research needs in the areas of logistics, supply chain management and the relationship with integrated intermodal systems;
- develop proposals for a European airspace structure that are able to support an efficient traffic flow based on needs rather than on existing national structures;

- examine, through current and past experiences in Germany and France, the implementation of regional rail-based transport (tram-train, regional tram, railcars, etc), and the importance of integrating both spatial planning and transport issues to foster sustainable urban and traffic development, especially on the periphery of cities;
- analyse implications of public policies on supply chains;
- produce guidelines for governments, standardisation organisations, transportation associations and container manufacturers to assist in the developments of rules to cover the implementation of small containers that are usable Europe-wide; and
- support the efforts of the EU and of the railway industry to achieve railway interoperability in Europe.

4.1.2 Main findings

To contribute to the reduction of the environmental impact of traffic by promoting more environmentally friendly transport in urban areas, the development of tramtrain systems can offer significant user and non-user benefits and, when used in harmony with other measures, achieve a substantial modal shift. In this context, the principal barriers are lack of political and therefore, financial, support, rather than any technical issues. Recommendations towards standardisation, harmonisation of European legislation and technical rules and other measures were established to create an environment for better use of horizontal transhipment in Europe.

With regard to research concerning proposals for a European airspace structure that are able to support an efficient traffic flow based on needs rather than on existing national structure, examples have been given of what can be achieved by taking a Single Sky view when redesigning airspace, but the designs described are relatively immature and would therefore need further input from local operational experts and assessment by real-time simulation before they should be considered for operational implementation (or deployment). In view of the sub-optimal character of the traffic samples and scenarios used (airport handling traffic more than their maximum and other not fully realistic elements) and the overall positive results of the redesigns, the main conclusion is, that given further local optimisations (both regarding civil and military aspects) a solution, whereby traffic density is at a level originally predicted for the year 2005 (a 35% increase in overall traffic compared to 1999), is feasible.

The development of conventional rail or urban/peri-urban light rapid transit provides a new way to develop cities. The choices made in recent years to limit the effects of layered urban development have been different in Germany and France. In Germany, a high level of urban density has been favoured, mostly around points which are well served by public transport, such as stations, thus leading to clustered development, whereas in France, urban planning around main transport arteries has been the norm. The project 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 and a feasibility study of the schematisation and recommendations.

Alternative strategic tools include the establishment of transport networks, the creation of seamless operations and transport process flows; vendor managed inventory and the collaborative planning and management of transport. The research suggests that these strategies often involve collaboration between customers and suppliers – transport should

not be seen as a consumable, but instead as part of the overall service package to the end customer.

Concerning the developments of rules to cover the implementation of small containers that are usable Europe-wide it can be concluded, that the use of small containers will result in improved use of vehicles due to faster transhipment at consignors and consignees which, together with the avoidance or simplification of intermediate transhipments, makes small containers potentially suitable for intermodal freight transport over shorter distances. Therefore, possibilities in the areas of airfreight, coastal shipping and inland waterways should be seriously considered. Increased intermodal transport has the potential to contribute to the development of freight transport that is more environmentally friendly and energy efficient.

A network of experts from railways, infrastructure owners, safety authorities, manufacturers, engineering and consultancy firms, and from universities and industrial research institutes has been implemented and can be seen as a support network of contacts to tackle the issue of electrical systems compatibility particularly in relation to the interoperability of European railways. This network fosters interaction processes between decision-makers and decision-takers.

4.2 Infrastructure features

The physical boundary conditions for interoperability/integration can be divided between track and terminals, and the main topics are to:

- Improve the (internal) operation of the infrastructure;
- harmonise and standardize physical interfaces; and
- develop unified and harmonized safety standards for the operation and construction of infrastructure, including working conditions.

4.2.1 Research objectives

The research objectives in the field of infrastructure features deal with:

- Contributing to the Corridor Policy elaborating Guidelines based on a bottom up multidisciplinary approach;
- giving an overview recent European developments;
- identifying barriers to Tram-Train integration and recommended solutions;
- assessing the modelling/forecasting /appraisal needs over the next 20-30 years to meet major policy and investment requirements;
- evaluating, with the aid of a cross-sectional demand model, "clean sheet" strategies for national and regional inter-urban networks;
- integrating different transport modes and land-use in a more sustainable manner within the context of the Trunk Road network;
- taking account of integrated town planning and travel rests at the heart of land use planning; and
- proposing and demonstrating practical solutions for how a "whole-journey-concept".

4.2.2 Main findings

It is well known that the inland navigation generates less negative impacts in term of congestion, safety and environmental pollution than the road. It is thus important to understand what are the main barriers which hinder a shifting of cargo from the road to the waterway on networks where very specific economic, administrative, organisational, political and infrastructural conditions are in existence. In order to prevent that traffic becomes a barrier to the socio-economic development, it is absolutely necessary to look for transport alternatives. Mainly, for good flows, inland waterway mode, with its considerably high amount of free capacities, appears to be such a possibility.

Several scenario simulations have shown how transport infrastructure investments improve the accessibility and hence economic competitiveness of regions. However, the transport policy of the European Union does not only serve competitiveness objectives. The European Union hopes to contribute by its transport policy also to territorial cohesion, a reduction of economic disparities between the central and peripheral regions in Europe. In particular, after the enlargement of the European Union great disparities on accessibility between the old and the new member states pose serious problems of spatial equity, which are aggravated by the goal conflict between territorial cohesion and the competitiveness goal of the Lisbon Strategy.

On the whole, it can be said that a Pan-European corridor is the result of a decision making process in which different actors, operating in different places at different times, act coherently for a common interest. A premise to the institution of a Pan-European corridor is the definition of a specific, long-term 'corridor policy' shared by all of the actors.

Guidelines and methodological tools for local authorities and other partners have been developed 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.

4.3 Operational features

The process of interoperability/integration covers the following topics:

- Compatibility of means and components of operation, including the means of transport;
- seamless transition within the transport chain from one operator to another; and
- economic and efficient operating procedure.

4.3.1 Research objectives

In the area of operational features research is based on:

- Making freight transport by rail more appealing to container providers and final customers by simplifying cross border operations which are time consuming and require a high level of human intervention. This simplification is conceivable if systems embedded in the freight trains are interoperable from a technical point of view in the locomotives pulling these trains and from a geographical point of view through different countries and boundary crossings.

- Enhancing performance and competitiveness of cross-borders freight rail transport by providing a system for the control of several hauling locomotives distributed along a train in the new heavy/coupled/long/modular trains concept that is emerging for the optimisation of the expansive slot use and the decrease of hauling costs.
- Demonstrating different concepts aimed to improve the distribution of goods within urban areas and between intermodal terminals/freight centres and urban areas.
- Introducing new operational approaches in road-rail intermodal transport by horizontal transfer technologies, mainly the possibility to organise economic road-rail transport on shorter distances.
- Tackling the challenging new configuration of proposed shuttles and creating an efficient system for getting the right containers to the right location at the right time.
- The standardisation of internal and external dimensions of container units to foster the implementation of small containers that are usable Europe-wide in order to make freight transport more efficient and thereby more environmentally friendly.
- Improving international freight transport within Europe by designing and implementing an innovative conveyor-belt rail production scheme.

4.3.2 Main findings

Distributed power systems appear to be a promising technology, which can provide solutions to conventional train limitations associated with train length and weight, as well as to operational constraints in the train circulation caused by the lack of sufficient (timetable) slots. Various system configurations were tested by the French, Italian and Swiss railways, which aimed to evaluate the adaptation of a wireless locomotive control arrangement under real railway environment. Interoperable systems provide a larger market for freight operators, allowing them to operate on the whole European territory. Equipment manufacturers also take advantage of interoperability by offering the same services in each European country, thus enlarging their markets and decreasing their costs.

Integrated transport of passenger and freight has the advantage of fast access to city centres but showed limitations in the feasible sizes of the cargoes as well as organisational difficulties for their transhipments. Demonstrations of use of alternative fuels, which included rape seed oil propelled delivery vans in Nürnberg and biogas fuelled vans in the Öresund site, made apparent as main barrier to large scale introduction the competition with other fuels having massive supply infrastructure.

Regarding the standardisation of internal and external dimensions of container units a proposal for a standardised family of small boxes, which are ¼ and ½ of the 7.45 m class C swap body have been developed. The proposal includes outside and inside measures, transhipment elements and transhipment methods, the full load weight of boxes as well as recommendations for transport and transhipment processes.

With respect to the validation of innovative horizontal transhipment technologies, a range of technologies - that have been developed as means of supporting the general objective of enhancing the attractiveness of intermodal cargo - has been examined. The project has reviewed these and arrived at conclusions on the validity of these existing initiatives. A survey on horizontal transhipment technologies developed in recent years together with a report on their commercial aspects (as far as operation had been introduced) has been conducted. Three demonstration concepts have been designed into operating formats.

In view of the innovative conveyor-belt rail production scheme a fast over-day train path Lübeck-Mannheim/Ludwigshafen has been developed. This will bring about a completely

new intermodal service and a substantial increase of competitiveness of intermodal transport. Currently, intermodal freight trains operate overnight (night jump) owing to the priority of passenger trains during the daytime. But on certain corridors such as the project route, there is a large market potential for over-day services. In existing rail production schemes, wagons used on intermodal overnight services remain unemployed in intermodal terminals for 12 hours or more before they are deployed for the next train run. The conveyor-belt rail production scheme aims to achieve a perfect round trip for the wagons over 24 hours, raising the efficiency of the assets considerably. All operational processes will have to be perfectly synchronised. A hard quality assurance system of this scheme will be implemented.

4.4 Organisational features

Planning and organization of interoperability/integration addresses the following topics:

- Coherent organisational concepts;
- compatibility of the organization / planning tools and administration; and
- common organisational strategies.

4.4.1 Research objectives

Research on organisational features aims at the

- Elimination of road traffic problems in the urban areas surrounding the ports (> 2000 trucks/ day for a second rank port) in favour of the middle range railway transport;
- development of demonstrable optimised concepts and integrate new technologies to improve multimodal freight transport and test them in real demo sites, and to reinforce intermodal links with special emphasis on easing, improving and facilitating cargo flows between inland and sea (loading / unloading cargo operations);
- production of systems and services for moving freight from origin to destination by intermodal chain, where water transport is enhanced;
- development of an integrated methodology for the evaluation of impacts of local traffic plans on accessibility, traffic liveability, noise nuisance and air quality;
- development of new recommendations for local policies related to mobility, environment, road safety and urban planning;
- generation of generic benefits which can enhance the effectiveness and efficiency of freight transport; in particular the objectives were to analyse and document logistics, transport and management practices involved in the partners' current supply chains; the assessment of vehicle utilisation enables the benchmarking both intra- and inter-industrial sectors;
- development of demonstrable optimised concepts and to integrate new technologies to improve multimodal freight transport and test them in real demo sites, and to reinforce intermodal links with special emphasis on easing, improving and facilitating cargo flows between inland and sea; and
- integration of ports into intermodal transport chains by harmonising administrational procedures and offering a set of information and communication tools and services for easing the mandatory data supply as well as the data delivery to other partners in the chain.

4.4.2 Main findings

The research in the area of organisational features offers solutions and concepts how to optimise transport and traffic between inland and sea and to avoid congestions. In more detail, concerning the elimination of road traffic problems in urban areas surrounding ports, a dedicated link connecting a seaport with a hinterland depot into a practical prototype has been created. These electrically-powered, computer-controlled shuttles will run either individually, or in convoy mode. Each shuttle will transport up to six container units and will run either on a dedicated railway line or on a concrete pathway. The solution will avoid congestion at the quayside and provide a fast and consistent throughput, improving the rate at which freight is currently transferred to the ship. Further increases in the rate of freight transfer will be effected by the use of improved container and lifting equipment. Investment costs at the quayside will be also be reduced and as a consequence of this and the reduced quayside space requirements, smaller ports will be in a position to accept freight. This will improve the overall flexibility of the transport arrangements and the additional sea and inland waterway routes will help to reduce road traffic.

Furthermore, existing technologies have been studied, in order to adapt on an application to improve the land-sea connection. This resulted in the rational design of a new RoRo ship optimised for short sea shipping integrating automated guided vehicles. This will offer intermodal and maritime operators a technology that will significantly boos their operating efficiencies and freight volumes. Other projects created models for impact measurement of traffic and freight transport, especially with regard to environment. Recommendations have been developed concerning the establishment of transport networks, the creation of seamless operations and transport process flows; vendor managed inventory and the collaborative planning and management of transport. The research suggests that these strategies often involve collaboration between customers and suppliers – transport should not be seen as a consumable, but instead as part of the overall service package to the end customer.

With regard to the harmonisation of administrational services a Web site and a decentralized virtual portal offering a set of tolls and services has been designed. Electronic links with ports, port community systems, terminals, shipping lines and logistics operators have been established in order to test the services.

4.5 Information technologies

Information technologies, especially telematics, have a key function to provide safe and efficient interoperability/integration, and include the following topics:

- Compatible information concepts and systems;
- traffic management systems;
- traffic command and control systems;
- tracing and tracking systems;
- standards for data flow, data content and interfaces;
- harmonized safety standards and certification procedures; and
- compatibility of hardware and software.

4.5.1 Research objectives

Research in the area of Information technology is mainly addressed on:

- Demonstrating how to efficiently organise and manage intermodal door-to-door transport chains, in which shipping plays a major role, by using logistics management and communication systems. Such systems would support and automate business transactions and information exchange between the different actors in the transport chains.
- Implementing and assessing in five sites (Nürnberg in Germany, the Öresund region, the Ile de France, the Randstad agglomeration in The Nerherlands, and Zürich) innovative solutions in the following areas: regional or local bundling of urban freight transport, using common carriers or co-operative distribution concepts (Nürnberg, Öresund, Randstad, Zürich), new loading units in urban intermodal transport (Nürnberg, Zürich), new ICT applications for information exchange in intermodal transport, including optimisation of distribution networks (Nürnberg and Randstad) and multi-operator tracking and tracing systems (Nürnberg, Ile de France), new transhipment systems (Zürich), combined passenger and freight transport concepts (Öresund), and use of alternative fuels and energy sources in urban freight vehicles (Nürnberg, Öresund).
- Developing demonstrable optimised concepts and integrate new technologies to improve multimodal freight transport and test them in real demo sites, and to reinforce intermodal links with special emphasis on easing, improving and facilitating cargo flows between inland and sea (loading / unloading cargo operations).
- Promoting and facilitating the use and practical application of results from previous research projects in the field of electrical systems compatibility of railways. A main aspect is to enhance and share the knowledge about electrical systems compatibility among all players in the railway community with the aim to improve safety and operational reliability, and to reduce time and cost for the acceptance of new vehicles on existing railway systems.
- Demonstrating the integration of transport modes in real transport operations by building and using, in real cases, integrated management and communication systems for door-to-door intermodal transport chains.

4.5.2 Main findings

Several projects have demonstrated how to accomplish efficient transport chain management with the assistance of advanced information and communication technology, and provided examples of new elements in the Intelligent Transport System. The main results comprise a transport chain management system available as a web based application available on the Internet, a monitoring system, the efficient implementation of a system integration tool (communication platform), simulation and service profiling technology and tracking and tracing technology. Another important element was the methodology that was developed to show how to implement such systems efficiently in five transport chains based on the generic business model for transport chain management that was developed. The research in this field mainly concentrates on the use of information and communication technology with the introduction new elements in the Intelligent Transport System. Some of the main results were: a generic business model for transport chain management, an open data model covering all aspects of intermodal transport, a technical solution for a commercial Freight Transport Monitoring Services, a technical solution for a commercial Transport Chain Management System, samples of “smart” transport equipment and software illustrating the potential for smart technologies to improve the competitiveness of intermodal transport.

The applications can be used by all transport chain managers that manage transport chains of a certain minimum complexity (several segments in the intermodal chains managed) and performance/cost requirements. The use of such applications reduces the costs and improves the reliability of logistics chains and thereby improves the long-term performance/cost ratio. In such situations the application provides a better solution than the current state-of-the-art. Reason being that existing application focus on strategic level simulation, not embedded in the actual operating environment and therefore lacking essential input data to safeguard results that can be deployed in operating environments.

Besides the development of several tools and databases to offer new solutions or to connect different systems a network of experts – the so-called User Group – from railways, infrastructure owners, safety authorities, manufacturers, engineering and consultancy firms, and from universities and industrial research institutes has been implemented and can be seen as a support network of contacts to tackle the issue of electrical systems compatibility particularly in relation to the interoperability of European railways. In addition, an information management tool has been created, which is a relational database to be accessed via Internet by the registered users of the above mentioned User Group. In the database all interference requirements and the power supply characteristics of the main railways in Europe as well as case histories or other valuable information is available. The tool and its contents are intended to assist all railway organisations in the development of Technical Standards for Interoperability, in the definition of requirements, in the design of railway systems and components and in the resolution of problems.

4.6 Conclusion

In order to manage predicted increases in freight transport, the European Commission is continuously taking steps to foster the use of intermodal systems. Integration of different modes within the transport chain will result in improved flexibility, quality and cost effectiveness and will activate competition between transporters instead of between transport modes. The development of a seamless web of integrated transport chains, linking road, rail and waterways is a key objective of the EU's Common Transport Policy, as outlined in the White Paper, entitled “European transport policy for 2010: time to decide”. The integration of truck, train, and ship transport, including on inland waterways, faces a range of obstacles especially with regard to the ongoing tendency to move toward the optimum use of all existing infrastructures. Furthermore, globalization, lead-time reduction, customer orientation and outsourcing are some major changes for logistics management to be considered. The role of logistics providers is changing both with regard to contents and complexity and a lot of companies from different areas are entering the market competing with traditional transport and warehousing companies. Against this background, a lot of logistics IT systems exist and in some cases the terminology and descriptions of the functionality of the applications have not yet reached global standardization.

For the majority of the projects analysed, it might be too early to determine the extent to which real-life impacts had occurred or would occur. A lot of dissemination has been done, but in some cases there has been a poor availability of project results and interim outputs. The majority of projects analysed so far are relevant for the integration of sectoral policies, but some areas, like for example barriers to implementation are not explored in greater detail. Some projects have identified different types of barriers to effective implementation but have yet to consider the most successful ways of overcoming these barriers. Key areas of concern are public acceptability and finance. In the latter area, more research is needed

into the success of different approaches to financing land-use, transport investment and operations.

The main focus of several of the research projects primarily lies on transport policy, with land use planning policy and/or environmental policy playing more a secondary role. Other projects have their emphasis on institutional, organisational or implementation issues. Most of the research organisations are much more familiar with scientific, technical and quantitative approaches than with interdisciplinary, organisational, quantitative, political approaches. A potential area in which further research might be important is the understanding of how to integrate policy instruments in the area of transport, land-use and environment. Against this background there should be a better transferability of project results from one context to another.

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Annex I: Contributing projects

Preface This Annex lists all the projects (European and national) which belong to the **Integration** 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: **Integration**			Last update: **11 August 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
ALPENCORS	Alpen Corridor South	EU	Infrastructure features

Key findings

As result of the analysis concerning whether the implementation of the transport infrastructure projects examined will contribute to the convergence or divergence of accessibility and economic development between the regions in Europe at large and in the AlpenCorS regions, following outcomes have been obtained:
Simulation of 6 different scenarios in the AlpenCors area (186 regions) to analyse the correlation between transport infrastructure investments and accessibility and economic competitiveness;
Conclusions about synergies between different scenarios: considering scenarios designed according the indicators for measurement of cohesion effects of transport infrastructure projects, interesting conclusions has been obtained;
Highlight positive factors for the institution of the central part of the pan-European Corridor V within the framework of the European reunification process.
Development of the SASI model: used to forecast economic development in the regions within and outside the corridor, subject to:

- Assumptions about economic development in Europe at large;
- assumptions about the process of EU integration of new countries and accessing ones;
- assumptions about the implementation of EU and national policies in themes like Economy, Transport, Migration, Interregional Cohesion or Convergence between regions.

Some limits of the analysis carried out should be recognised: It did not analyse the impacts of different scenarios of transport costs of Alpine crossings. Such an analysis would allow to reflect about a fair distribution of costs and benefits of the Alpine crossings. It did not analyse the impacts of different scenarios for the east-west transport corridor (Corridor V) and the interactions with the Brenner Corridor (Corridor I). Broader issues, such as social and environmental effects could not be addressed.

Policy implications

The results of the scenario simulations presented so far have shown how transport infrastructure investments improve the accessibility and hence economic competitiveness of regions. However, the transport policy of the European Union does not only serve competitiveness objectives. The European Union hopes to contribute by its transport policy also to territorial cohesion, a reduction of economic disparities between

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the central and peripheral regions in Europe. In particular, after the enlargement of the European Union great disparities on accessibility between the old and the new member states pose serious problems of spatial equity, which are aggravated by the goal conflict between territorial cohesion and the competitiveness goal of the Lisbon Strategy. On the whole, it can be said that a Pan-European corridor is the result of a decision making process in which different actors, operating in different places at different times, act coherently for a common interest. A premise to the institution of a Pan-European corridor is the definition of a specific, long-term 'corridor policy' shared by all of the actors.

Project website

dev.alpencors.net

ASAPP ONE	Intelligent Shuttle Fleet Connecting A Split Container Storage Area For Intermodal Operation Improvement	EU	Operational features; Organisational features

Key findings

The ASAPP project, followed by the ASAPP ONE project which runs until August 2003, created the definition of a dedicated link between sea ports and hinterland depots, running an automated shuttle. The ASAPP ONE project has facilitated a prototype by means of a consortium of industrial partners, SME, engineering firms, and research institutes selected to minimise the timescale of the research phase. The participants have developed the concept of the dedicated link connecting a seaport with a hinterland depot into a practical prototype. The hinterland depot will accept freight from road vehicles and transfer it via the automated shuttle to the port where it is transferred to ship. The electrically-powered, computer-controlled shuttles will run either individually, or in convoy mode. Each shuttle will transport up to six container units and will run either on a dedicated railway line or on a concrete pathway. The hinterland depots will eliminate upwards of 2000 trucks a day from the urban areas in the vicinity of major ports. The solution will avoid congestion at the quayside and provide a fast and consistent throughput, improving the rate at which freight is currently transferred to the ship. Further increases in the rate of freight transfer will be effected by the use of improved container and lifting equipment. Investment costs at the quayside will be also be reduced and as a consequence of this and the reduced quayside space requirements, smaller ports will be in a position to accept freight. This will improve the overall flexibility of the transport arrangements and the additional sea and inland waterway routes will help to reduce road traffic. The overall costs of transport will also be reduced and this will reduce the break-even costs of intermodal transport to the target of around 200 km.
The main project output are:

- The establishment of one full-scale prototype shuttle to be used in connection with the actual ASAPP for the behaviour tests;
- the sensor system, hardware and research;- the application program for the line management system and related research; and
- the split terminal virtual system (simulation) to validate the performances by means of case studies. The expected timing for exploitation of these results is three to five years after the end of the research contract.

Policy implications

None.

Project contact

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Theme: **Integration**			Last update: **11 August 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
BAHN.VILLE	Promoting a rail oriented urban development approach for urban regions in Germany and France	FR/ DE	Policy features

Key findings

The key results focus on the effects of urban development and rail development policies.
"Bahn" – rail service supply:

- Quantitative improvements in the local/regional rail service, such as frequency, clockface timetable and spread of services through the day) increases the range of journey types for which the train can be used, and hence the attractiveness of rail for people who have a choice of different modes.
- Qualitative improvements in services (comfort, service, new rolling stock, etc) plays a fundamental role in improving the image of rail transport and hence in promoting a modal shift towards rail for people who have a choice of different modes.
- The absence of major differences in service level along a line allows the access and egress distances to/from stations to be reduced. This strengthens the role of non-motorised access/egress modes (walk, cycle) and, from the rail operations point of view, allows greater optimisation of rolling stock usage.

"Ville" - the urban environment:

- The importance of walking as an access/egress mode for rail stations implies that particular attention needs to be paid to station access design and facilities.
- 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.

Station:

- Increasing the number of stations through new openings allows the potential number of passengers to be increased, and leads to shorter access/egress distances as well as an increase in slow modes (walk, cycle) for station access. Although an increase in the number of stops on a line tends to reduce the overall average speed of services, technical improvements to rolling stock can reduce the impact of this.
- 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.
- The facilities and services offered inside the railway station are used both by rail users and non-users. In this, the services constitute for the rail users an improved waiting environment. For non-users, they contribute to raising the importance of the station though improved urban integration.
- The multiplicity of a station's functions dictates that there should be an effective management of space in the proximity of the station and implies in particular the principle of limiting spaces devoted to car parking.
- This limitation is made possible by the existence of alternative access to the station by local public transport.

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 suc-

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Key findings / Policy implications / Project website or contact			

ceed 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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COST 339	Technical and economic conditions for the European wide operation of intermodals transport units (small containers)	EU	Policy features; Operational features

Key findings

Developments of rules to cover the implementation of small containers that are usable Europe-wide. It can be concluded, that the use of small containers will result in improved use of vehicles due to faster transhipment at consignors and consignees which, together with the avoidance or simplification of intermediate transhipments, makes small containers potentially suitable for intermodal freight transport over shorter distances. Therefore, possibilities in the areas of airfreight, coastal shipping and inland waterways should be seriously considered. Increased intermodal transport has the potential to contribute to the development of freight transport that is more environmentally friendly and energy efficient.

Policy implications

COST 339 is a pre-study useful for a following standardisation process, addressed to the EC and standardisation authorities in Europe (CEN TC 119).
There is a need for further detailed studies before small boxes can be standardised by CEN. A consortium of experts coming from COST 339 management committee and the industry proposed to EC DG TREN to include the follow-up development in the 6th R&D programme.

Project website

www.cordis.lu/cost-transport/src/cost-339.htm

CROSSRAIL	Integrating Local and Regional Rail Including Cross Border Aspects	EU	Policy features; Infrastructure features; Information technologies

Key findings

- Study of current developments in tramtrain in Europe;
- the identification and quantification of the user benefits attributable to the introduction of tramtrain schemes;
- the identification of key barriers to the introduction of schemes;
- recommendations for solving the barriers that may occur when implementing tramtrain systems;
- 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; and
- recommendations for new urban infrastructure.

Policy implications

- The development of tramtrain systems can offer significant user and non-user benefits and, when used in harmony with other measures, achieve a substantial modal shift;
- principal barriers are lack of political and therefore, financial, support, rather than any technical issues;
- there is little difference between cross-border and domestic schemes, except that although problems ten to be the same in both, the magnitude is greater in the former;

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- market size for tramtrain vehicles is in the region of 7-60 vehicles per annum over the next 30 years, with a medium scenario of around 30 vehicles in average per year;
- standardisation of design is currently hampered by need to produce rolling stock in short runs, adapted to specific infrastructural requirements; whilst the Functional Requirements Specification produced by the project should facilitate the placing of common orders by different operators (hence reducing production an purchase costs); and
- harmonisation of infrastructure standards in the future could further benefit development of new schemes and avoid the need for costly adaptations of rolling stock design.

Project website

www.tramtrain.com

D2D	Demonstration of an integrated management and communication system for door-to-door intermodal freight transport operations	EU	Information technologies

Key findings

The project has demonstrated how to accomplish efficient transport chain management with the assistance of advanced information and communication technology, and it has provided examples of new elements in the Intelligent Transport System.
The main results of the project comprise a transport chain management system available as a web based application available on the Internet, a monitoring system, the efficient implementation of a system integration tool (communication platform), simulation and service profiling technology and tracking and tracing technology. Another important element was the methodology that was developed to show how to implement such systems efficiently in five transport chains based on the generic business model for transport chain management that was developed.
The Transport Chain Management System developed throughout the course of the project into a system that was able to handle complex transports in a simple way. Great emphasis was put on making new transport chains very easy to create, either by entering new information or by selecting existing legs and chains, which can be combined by drag-and-drop functionality. The user interface is intuitive and easy to understand for the logistics managers. In addition the structure of the database was carefully designed to maintain data integrity and avoid data redundancy; while at the same time have the ability to cater for most possible cross references and links. The system now supports automated transactions through EDI with business partners, and keeps track of these transactions for documentation purposes. Further, it allows for flexible transport chains that can be altered during the course of the transport, but which still keeps track of the changes in a way that allows for control of charges and correct invoicing. In addition the system can handle box-in-box, which makes it possible to create complex load hierarchies and keep visibility on multiple levels. In more detail, the project management is especially satisfied with the scientific results and the innovations related to WP1 Business modelling, WP3 Transport Chain Management System and WP4 “Smart Technologies”. These work packages are innovative in different ways. WP1 brings to the table a more comprehensive explanation of the role of the Transport Chain Manager in the deliverable D3.1 A Generic Model for Transport Chain Management. This model rests on the results of a number of previous projects and on the analysis of the five transport chains included in this project. The result is an excellent structured overview of the different activities a transport chain manager would undertake. The Freight Transport Monitoring System and the Transport Chain Management System build on the results of the analysis in WP1.
WP3 succeeded beyond expectations to provide a system that is believed to be unparalleled in its ability to facilitate fast creation of transport chains from pre-defined building blocks. In addition it is built on the

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Transport Reference Information Model (TRIM), which is further enhanced for the use in this project. The result is an extremely flexible system, with ability to manage numerous complex transport chains, provide efficient control of service providers, provide transport alerts and keep track of the re-arrangements of the chain and follow cargoes on multiple levels (hierarchical load units).
WP4 is innovative in many ways, but in particularly in its attempt to make transport simulation and tracking of service provider performance available to an operative transport management environment. A number of tracking devices were tested and in order to achieve further control along the chain, possibilities for integration between TCMS and traffic information was investigated and to a certain extent developed.

Policy implications

Integration between all the transport modes is one of the key objectives in the Growth Work Programme. This project will demonstrate such integration in real transport operations. Hence, it will contribute to the promotion of such transport chains as viable, not only from a social and environmental point of view, but also from a pure business perspective, i.e. promoting transport sustainability. The five demonstrations have supported the European transport policy by focusing on how to efficiently organise and manage multimodal transports. By introducing advanced systems for easy creation of complex transport chains and facilitate efficient communication with many service providers, the complexity of organising both the physical transport and the information flows is greatly reduced. The introduction of advanced tracking technology and automatic simulation and service profiling, will assist in reducing waiting time along the chain and thereby increase the competitiveness of such chains. This way the project has promoted technology that supports a shift from single modal “only truck” transport to multimodal transport utilising train, inland waterways and ocean transport. Obviously, the main contribution of the D2D system to EU-policy lies in the field of transport policy. It takes away an important barrier to intermodal transport: the complexity of organising the physical and information flows is greatly reduced. Thus, the D2D system can help:

- Preventing congestion by promoting modal shift;
- contributing to sustainable mobility by supporting the use of less polluting modalities; and
- improving the quality of transport services by providing an innovative system for intermodal transport chains.

Other policies that the D2D system may be expected to contribute to are:

- Cohesion: the Spanish and Portuguese demonstrators show how the D2D system helps organising intermodal transport chains to peripheral areas of the EU.
- Qualification and working conditions: the D2D system may improve working conditions of transport company personnel by relieving them of some of their most stressful tasks, and may also result in a need for higher qualified personnel by enhancing quality and accuracy of information flows in the chain.
- Environment: shifting from road transport to intermodal transport will resulting less air pollution, reduction of noise and less energy consumption.
- Quality of life and health and safety of the citizens: reducing pollution and noise will have a positive impact on the quality of life and health of the citizens. Quality of life may also be improved by relieving congestion.

The modal shift will also have a positive effect on safety. The TCMS is now in use by Norwegian Post Logistics Division as a commercial software application. The software will be further enhanced and marketed by participants of the D2D project. Other companies outside the D2D project will be able to purchase the TCMS software solution and may in the future also use other part results of the D2D project; like the service profiling system from ISL or the simulation tool interface developed by Marintek and BMT. The applications can be used by all transport chain managers that manage transport chains of a certain minimum complexity (several segments in the intermodal chains managed) and performance/cost requirements. The use of such applications reduces the costs and improves the reliability of logistics chains and thereby improves the long-term performance/cost ratio. In such situations the application provides a better solution than the current state-of-the-art. Reason being that existing application focus on strategic level simulation,

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not embedded in the actual operating environment and therefore lacking essential input data to safeguard results that can be deployed in operating environments.

Project website

prosjekt.marintek.sintef.no/d2d/

EDIP	On-board radio-based control of multiple-locomotive freight trains for trans-European operation	EU	Operational features; Information technologies

Key findings

Distributed power systems appear to be a promising technology, which can provide solutions to conventional train limitations associated with train length and weight, as well as to operational constraints in the train circulation caused by the lack of sufficient (timetable) slots. Various system configurations were tested by the French, Italian and Swiss railways, which aimed to evaluate the adaptation of a wireless locomotive control arrangement under real railway environment. Early results indicated that transmission systems optimized to operate at the 5.8GHz band present no data losses (transmission holes) for distances up to 400 meters, whereas transmission at lower frequencies will require the installation of repeaters along the train or in difficult areas (e.g. inside long or curved tunnels) in order to guarantee high quality transmissions.

Policy implications

Interoperable systems provide a larger market for freight operators, allowing them to operate on the whole European territory. Equipment manufacturers also take advantage of interoperability by offering the same services in each European country, thus enlarging their markets and decreasing their costs.

Project contact

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ESCUGIBRI	ESC UserGroup and InfoBank to support Rail Interoperability	EU	Policy features; Information technologies

Key findings

The project contains two core elements:

- The ESC UserGroup: a network of experts from railways, infrastructure owners, safety authorities, manufacturers, engineering and consultancy firms, and from universities and industrial research institutes.
- The ESC InfoBank: an information management tool, implemented as relational database to be accessed via Internet by the registered members of the UserGroup.

A consortium of four partners is responsible for the InfoBank and for networking activities and events, such as a yearly workshop for all members. The consortium partners are Bombardier Transportation (Sweden), AEIF (the Association for Railway Interoperability in Europe), CIRT (the transport research institute of the University of Genoa, Italy), and ENOTRAC AG. In the consortium, ENOTRAC is in charge of the maintenance and further development of the ESC InfoBank and of the project web site. This includes the entry of information collected by the other consortium partners and by subcontractors. The aim is to collect all interference requirements and the power supply characteristics of the main railways in Europe. The members of the UserGroup are expected to contribute case histories or other valuable information from their own background for entry into the InfoBank as a 'membership fee'. In the first half of the project, a workshop in Paris has attracted more than 80 experts from all over Europe. So far, accounts for access to the ESC InfoBank have been opened for more than 120 users. The InfoBank tool and the Web site are fully

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operational. See http://www.esc-usergroup.org and http://www.esc-infobank.com. The ESC UserGroup project was participating with an exhibition stand at the EC research conference in Valencia in June 2002. At the same conference, ENOTRAC was invited by the EC to chair a conference session dedicated to electrical systems compatibility of railways.

Policy implications

The problem of defining ESC interfaces and requirements between owners, operators and suppliers still exists today. The ESC UserGroup project has been a focal point to tackle this over the last 2½ years and has provided tools and information to aid all members facing the issue. The risk is now that without future funding and a patron both of these instruments will vanish. The reality seems to be that either a strategic organisation needs to take the lead and operate these instruments for the benefit of all railway organisations or alternatively each individual railway organisation needs to have readily accessible there own internal database of ESC information which can be easily shared with to other railway organisations.
The benefit of the top down strategy is that ESC has a clear focus, strategy and lines of communication for the benefit of all industry players. The second option allows for closer information management and updating to be performing thus assuring the accuracy and ownership of the different database contents but lacks leadership and coordination with the potential loss of any synergies.
Although no new backer has stepped up to lead this work there is a strong amount of interest industry wide that this lack of clear ESC requirements and interfaces is resolved. Although support in hard financial terms and resources has not readily come forward, vocal support and expressions of interest have been numerous from all segments of the industry. It is clear therefore that this issue requires further attention in the short to medium term future and a strategic industry leader needs to position itself in such a way as to cover this.

Project website

www.esc-usergroup.org / www.esc-infobank.com

FRAIT	Free-ranging automated industrial transport	EU	Information technologies

Project website

www.eureka.be/ifs/files/ifs/jsp-bin/eureka/ifs/jsps/projectForm.jsp?enumber=727

GIFTS	Global intermodal freight transport system	EU	Operational features

Project website

gifts.newapplication.it

HVB2	High Voltage Booster – second phase	EU	Infrastructure features

Project website

ica.cordis.lu/search/index.cfm?fuseaction=proj.simpledocument&PJ_RCN=4865011&CFID=937088&CFTOKEN=89609898

Theme: **Integration**			Last update: **11 August 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
IDIOMA	Innovative distribution with intermodal freight operation in metropolitan areas	EU	Operational features; Information technologies

Key findings

All IDIOMA innovations showed, generally, a reduction of emission levels but the economic performance was unsatisfactory. Regional or local bundling projects, which included testing of a multi-temperature vehicle for composite distribution of goods in the Öresund site, were only partially successful and were found difficult to implement in the current transport business environment. While in some cases computer-based network optimisation helped achieve environmental benefits, savings of distribution costs could not be proved. City/small container concepts showed technical problems which in principle can be solved, while the commercial perspective is more uncertain with high transhipment costs being the main barrier.
The in-time provision of traffic information proved effective in eliminating a substantial part of the delays at the intermodal centres. The new horizontal transhipment system RTS-500 Furmia proved to be still too costly and difficult to work with for the terminal personnel but is expected to become operationally feasible in the near future with proper adaptation in the terminal infrastructure.
Integrated transport of passenger and freight has the advantage of fast access to city centres but showed limitations in the feasible sizes of the cargoes as well as organisational difficulties for their transhipments.
Demonstrations of use of alternative fuels, which included rape seed oil propelled delivery vans in Nürnberg and biogas fuelled vans in the Öresund site, made apparent as main barrier to large scale introduction the competition with other fuels having massive supply infrastructure.

Policy implications

The problems shown in the commercial performance of the IDIOMA concepts call for support to development of freight transport structures in urban areas and to training and education of transport operators.
The expectation that heavy vehicle fees might be introduced elsewhere following the Swiss example calls for the need to improve concepts in particular on the pre- and end-leg of intermodal transport.
Standardisation efforts and further demonstration projects are recommended for small containers which will more likely play only a marginal role in city distribution without large investments in infrastructure and equipment. An overall approach should be developed for the handling and carrying of intermodal equipment as well as the processes and the facilities in freight centres. Further research is recommended on the share and usage of information along the transport chain as well as the entire supply chain and on transhipment systems to make small-volume terminals more profitable.

Project contact

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IN.HO.TRA	Integration of Interoperable Intermodal Horizontal Transhipment Techniques in intermodal transport operations	EU	Policy features; Operational features

Key findings

The structure of INHOTRA has examined a range of technologies that have been developed as means of supporting the general objective of enhancing the attractiveness of inter-modal cargo. The project has reviewed these and arrived at conclusions on the validity of these existing initiatives. In addition a survey on horizontal transhipment technologies developed in the recent years together with a report on their commercial aspects (as far as operation had been introduced) has been conducted. From the original consortium three demonstration concepts have been developed into operating formats. A validation of these in relation to operational and commercial criteria is in active preparation.

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Policy implications

The InHoTra project is conceived as a parallel and co-ordinated research activity on the one side, and a set of technical developments and related test operations ("demonstrators") on the other side.
The research side covered mainly the following items:

- Creation of an overview on horizontal transfer system developed in Europe so far including a systematic evaluation of their specific technical details and their commercial life (if any);
- creation of a systematic approach to the evaluation of horizontal transfer systems in intermodal transport, their technical aspects and their commercial background; this evaluation scheme is similarly applied to the overview on historically realised solutions and for the equipment to be developed in the course of the project;
- technical and commercial evaluation of the equipment realised within the project, together with an analysis of target markets and comparison with competing techniques; and
- based on this evaluation, recommendations towards standardisation, harmonisation of European legislation and technical rules and other measures were established to create an environment for better use of horizontal transhipment in Europe.

In addition, a specific part of the study must cover the problems concerning current transport containers and their possible horizontal transfer, and the problems and experience gained with the horizontal transfer of European semi-trailers between road and rail.

Project website

www.inhotra.org

INTEGRATION	Integration of sea land technologies for an efficient intermodal door to door transport	EU	Organisational features; Information technologies

Key findings

Integration did not set out to invent completely new solutions, however. Instead, the partners carefully studied existing technologies and sought to adapt them or their application to improve the land-sea connection. The group decided that adapting established technologies would speed up their take-up by the industry. It also built on the results of another European project, IPSI, which had developed improved methods for automated cargo handling.
The early stages of the project identified two key technologies in current use. First, most short-sea vessels are roll-on-roll-off (ro-ro) ships, loaded 'horizontally' by driving containers on to the ship. Second, large ports such as Hamburg and Rotterdam have automated guided vehicles (AGVs) that move containers from a port's marshalling area to the quay cranes that normally load the ships. The second major activity of Integration is the rational design of new ro-ros, optimised for short-sea shipping.

Policy implications

The designs and the results from the AGV pilots will be used in freight transfer simulations. Theoretical demonstrations will be the first step in convincing the shipping industry to invest in these new ships and loading technologies. Prototype ships should be ready by as early as 2005.The challenge is to offer intermodal and maritime operators a technology that will significantly boost their operating efficiencies and freight volumes. The project will demonstrate the potential of the technology, and the way it can improve performance through improved management of operations. If successful, it will give Europe's shipyards and port equipment manufacturers a new lease of life.

Project website

www.maritime.deslab.naval.ntua.gr/research/projects.asp?id=integration

Theme: **Integration**			Last update: **11 August 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
INTERCEPT	Intermodal concepts in European passenger transport	EU	Policy features; Organisational features

Key findings

Main results from the assessments of travel behaviour have been:

- Reductions of up to 10% in car use have been achieved as a result of the application of the integrated measures;
- higher increase in multi-stage public transport mode share has been achieved where the initial multi-modal share involving public transport was lower (4.6% increase from 2.3% to 6.9% in Bristol compared to 3.6% increase from 36.3% to 39.8% in Bremen);
- results in Bristol showed that also ride sharing and walking mode were promoted and that the reduction in car usage achieved for the trip planner sub-sample (less 5% car) was improved when this “carrot” is combined with the “stick” of road pricing (less 12.8% car);
- the Bristol trial of electronic road pricing has demonstrated a significant spreading outside the two-hour morning peak when charging only during the peak; and
- respondents stating that the trip planner has helped them use a better public transport service ranged between 8% and 10% in Bremen and Bristol and new public transport trips were found as a result of new trip planner up to 7% of the participants (in the same cities).

Main results from the assessments of user acceptance and implementation have been:

- the internet-based public transport trip planner, developed to a common specification in the three sites, showed high levels of acceptance with those stating that they would either definitely or probably use this application in the future ranging between 70% and 90%;
- the intermodal trip planner in Bremen was developed to supply graphically address-based solutions while the intermodal trip planner in Barcelona offers park&ride, public transport and car travel times and costs side-by-side for a specified journey; the travel times are generally lower for car option than for public transport and the respondents agreed and disagreed in equal numbers to the statement that personalised information about road congestion could tend to promote car use;
- the digital video in Barcelona proved to be able to automatically record the level of illegal entries in the restricted access area;
- bookings of the “Cambio” car sharing in Bremen handled by the internet accounted for 10% of total; and
- the taxi dispatching system in Bremen based on GPS location and smart cards recording taxi information showed significant improvements in the efficiency of fleet management.

Policy implications

INTERCEPT results offer guidance on how to improve public transport information and realise service linkages and restraint measures so as to make the alternatives to car usage as attractive as possible. Exploitation lines of the public transport trip planner applications concern the extension of the geographical area covered and the integration of interactive walking/cycling elements. Integration with car travel information service should be contemplated because this would offer the advantage of convincing car-orientated travellers to select attractive alternatives and have the potential for using revenues from car traveller information services to fund intermodal travel planners. The increased confidence in video as an enforcement technology could be exploited for both safety and environmental objectives as shown by the plans for enforcement of red lights and clean zones in Barcelona.

Project contact

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Theme: **Integration**			Last update: **11 August 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
IP	Intermodal Portal	EU	Organisational features; Information technologies

Key findings

- Internet Site and a decentralized virtual portal offering a set of tools and services;
- IP is a multi-port service; it does not have the intention of substituting Port Community Systems but to extend their functionality;
- electronic links with ports, port community systems, terminals, shipping lines and logistics operators have been established in order to test the services;
- more than 70 users (11 countries); and
- services in live operation services offered by IP:
  - single desk,
  - Hazmat dangerous goods,
  - virtual ship agent,
  - voyage offering and quotation,
  - port order on-line,
  - real-time ETA,
  - transport order for trucks,
  - information BL, and
  - XML message definitions.

Policy implications

There are two main challenges tackled with the IP project to:

- Support the change towards the Information Society; and
- support the use of intermodal chains involving waterborne transport.

The reduction of road transport or at least a significant reduction of its growth is considered as an important contribution to the Community social objectives. In the long-term perspective, Intermodal Portal will contribute to port efficiency and thus to improve its role for economy and employment. A port is an important service provider and could generate many jobs outside the port and also internally within its own structure.

Project website

www.intermodalportal.com

LOGCHAIN	Building Of Advanced Freight Chains And Logistics Technology [Umbrella action: Generates Projects, but does not carry out R&D]	EU	Policy features; Infrastructure features

Project website

www.eureka.be/thematic/AcShowUmbrella.do?id=2402

LOGCHAIN EAST-WEST CARGO FLOW	Freightchain: Re-engineering East-West rail cargo flows for service and speed	EU	Operational features; Infrastructure features

Project website

www.eureka.be/inaction/AcShowProject.do?id=2453

Theme: **Integration**			Last update: **11 August 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
LOGCHAIN E-W-LAND-BRIDGE	Mini Water-Land-Bridge Between The Inland Port Of Nuernberg And The Adriatic Port Of Koper (Slovenia)	EU	Infrastructure features
Project website www.eureka.be/inaction/AcShowProject.do?id=2457			
LOGCHAIN E-W-TWO-WAY-NET	Improving East-West Freight Flow	EU	Operational features; Information technologies; Infrastructure features
Project website www.eureka.be/inaction/AcShowProject.do?id=2458			
LOGCHAIN MUSIC	Multimodal Swedish-German services instigating an innovative conveyor belt rail production scheme and E.D.I. system	EU	Operational features
Project website www.eureka.be/inaction/AcShowProject.do?id=2388			
LOGCHAIN RAIL GAUGE CHANGE	Economic Study Into Investment In An Automatic Rail Gauge Change System Within Pan-Corridor 1	EU	Operational features; Organisational features; Policy features
Project website www.eureka.be/inaction/AcShowProject.do?id=2353			
LOGICAT	Concerted action on logistics, supply and demand chain management in Europe	EU	Policy features

Key findings

- Information on finished, existing and future RTD Projects in the areas of logistics, Supply Chain Management and their relation with integrated intermodal systems have been collected;
- future research needs in the areas of logistics, Supply Chain Management and the relationship with Integrated intermodal systems have been identified;
- road maps for the implementation of the new logistics concepts have been designed;
- awareness has been raised and "Supply Chain Management" has been promoted, to facilitate implementation within Europe; and
- the use of integrated intermodal systems has been promoted.

Policy implications

LOGICAT will have an added value through the clustering exercise. The clustering will group together finalised, existing and proposed European and national (Member States) RTD projects as well as relevant U.S. RTD Projects with an European impact to enhance the effectiveness of logistics

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Theme: **Integration**			Last update: **11 August 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			

ONESKY — One Non-National European Sky — EU — Policy features; Infrastructure features

Key findings

Each region examined was redesigned in a number of iterations in order to optimise the airspace. Within the timeframe and resources of the project it was not possible to develop a proposal, which fully satisfied all requirements (some overloaded sectors remained after the last iteration). This was due to the fact that the core area in Europe must be shared between the Military and Civilian users. In view of the sub-optimal character of the traffic samples and scenarios used (airport handling traffic more than their maximum an other not fully realistic elements) and the overall positive results of the redesigns, the consortium concludes that, given further local optimisations (both regarding civil and military aspects) a solution, whereby traffic density is at a level originally predicted for the year 2005 (a 35% increase in overall traffic compared to 1999), is feasible. Also from the economic point of view the adoption of the principles for redesigning sectors based on the Single Sky initiative is practicable. The results have been assessed by developing a “worst case” and a “best case”. The worst case is calculated by combining maximum costs with minimum delay reductions. The best case includes minimum costs combined with maximum delay reductions. The results are expressed in terms of Net Present Value and Internal Rate of Return.

Policy implications

This report gives examples of what can be achieved by taking a Single Sky view when redesigning airspace, but that the designs described are relatively immature and would therefore need further input from local operational experts and assessment by real-time simulation before they should be considered for operational implementation (or deployment). Within the timeframe and resources of the project we were not able to develop a proposal which fully satisfies all requirements. However, in view of the sub-optimal character of the traffic samples and scenarios used (airport handling traffic more than their maximum and other not fully realistic elements) and the overall positive results of the redesigns, the consortium concludes that given further local optimisations (both regarding civil and military aspects) a solution, whereby traffic density is at a level originally predicted for the year 2005 (a 35% increase in overall traffic compared to 1999), is feasible. Looking at a scenario in which the present principles would be continued, a so-called “capacity-wall” will come about in the very near future (indicated by the highly overloaded initial designs within the clean sheet study), leading to increased delays and costs. Therefore adapting the principles of the “Single Sky” initiative should be started as soon as possible.

Project website

www.nlr.nl/public/hosted-sites/ONESKY/

OPTIRAILS II — Optimisation of Rail Traffic on European Corridors through ERTMS/ETML (Working out of System Requirement Specifications) — EU — Organisational features; Information technologies

Project website

www.optirails.gr

PI-WAMAS — Process Integrated Closed Cycle Water Management System for Dry Docks — EU — Operational features

Project website

ica.cordis.lu/search/index.cfm?fuseaction=proj.simpledocument&PJ_RCN=5168064&CFID=937729&CFTOKEN=38797203

Theme: **Integration**			Last update: **11 August 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
SUSPENSION 2000	Development of an innovative two-axle goods wagon dedicated to combined transport	EU	Operational features
Project website www.hlpdeveloppement.fr/en/financed-projects.php			
THEMIS	Thematic network on optimising the management of intermodal transport services	EU	Policy features
Project website www.themis-network.org			
TRIANGLE	Proof of concept for a simple, workable and manageable interoperable solution for door to door travel based on chip-card	EU	Information technologies; Operational features
Project website www.stib.irisnet.be/triangle/			
TRIDENT	Transport Intermodality Data sharing and Exchange NeTworks	EU	Information technologies
Project website www.ertico.com/activiti/projects/trident/home.htm			
UG220	Multi-modal modelling – A new look	UK	Infrastructure features

Key findings

The project produced a classification of differing modelling approaches and subsequently commissioned assessments of these approaches by transport research practitioners and other interested parties. This canvassing was undertaken in order to understand how the practitioners viewed the state of play of their art of modelling, and these views together with other material was used to produce a report outlining modelling possibilities. Focusing on the topic of travel, the many variations and techniques of the four stage approach to modelling, originating in the late 1950's, is still viewed as the mainstream transport research modelling tool covering the stages of generation, distribution, mode choice and assignment. The main characteristic of this modelling approach is that it implies:

- A zonal basis (spatial aggregation);
- demand is measured by trips or tours;
- a static or cross sectional structure (all input fixed in time);
- a structured set of choices; and
- a requirement in principle to iterate to equilibrium.

Even discrete choice or disaggregate models are seen as an enhancement of this model and not a departure from the four stage approach. Choice of time (potentially seen as fifth stage), or trip linking again is seen as enhancement to this mainstream approach. The alternative approaches identified, developed enough to be considered as mainstream, include the 'activity' model, 'dynamic' model', and 'land use/ transport' . As well as these, mainstream type approaches, other approaches were also considered in this study. No new approach has been identified, but significant advancements in the techniques (especially micro simulation) of implementing the approaches have taken place, especially with the advancing power

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of computing which has enabled earlier theory to be realised. The power of the latter is thereby enabling more holistic approaches to be developed which place the transport system within wider socio economic contexts, for example the inclusion alongside the topic of travel, the topics of car ownership, and population and employment characteristics.

Policy implications

The convergence of differing approaches is deemed worthy of encouragement, with a word of caution, that the step change in complexity in leading edge projects might be resulting in due diligence not being paid to individual components. The project recommends that an appropriate balance is struck between over simplicity and excessive complexity, 'bearing in mind the requirements for the state of the practice (as opposed to the state of the art). The complexity of models is an important issue in relation to considering how they can brought into general use. This caution is expressed in light of the concern that a gap already exists between state of art and practice. In addition, the project recommends that consideration be paid to whether ever increasing complexity is justified in terms of either a comprehensible model structure or some demonstration that the model's predictions accord with actual outturns.

Project website

www.rmd.dft.gov.uk/project.asp?intProjectID=11344

UG370	The impacts of futures scenarios on integrated transport policies	UK	Policy features

Project website

www.rmd.dft.gov.uk/project.asp?intProjectID=11289

–	An integrated instrument for the environmental evaluation of local traffic plans (linked to European projects DECADE, PROSPER, SATURN and TRANSPLUS)	BE	Infrastructure features; Organisation features

Key findings

Model for impact measurement on liveability in urban areas of noise and air quality.

Policy implications

Recommendations to policy makers concerning traffic impact on cities liveability.

Project website

www.belspo.be/belspo/fedra/proj.asp?l=en&COD=CP/37

–	Inland navigation and sustainable development: analysis of factors that increase its market RDA	BE	Infrastructure features

Key findings

Analysis of the possibility to shift cargo traffic to inland waterways Outline of obstacles to intensive use of waterway transport Pre-requisites for a successful integration of the system into intermodal chains Strategy for the future.

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Policy implications

The study is addressed to decision makers to make sector plans for sustainable development, to plan infrastructure integrating waterway transport into the logistical chain, policy for a more environmental friendly mobility

Project website

www.belspo.be/belspo/fedra/proj.asp?l=en&COD=MD/DD/17

–	Integrated public transport	SE	Infrastructure features; Organisation features

Key findings

The result of the study shows that changes between Flexlinjen and trams or big buses are more common than was expected. The preliminary study points out that 38% of the respondents had some sort of experience of changing between different traffic forms. Unfortunately the project failed to accomplish any considerable improvements concerning the specific change between Flexlinjen and the main lines.
In order to increase the possibilities for a person with a permit (to go by Färdtjänst) to use the regular public transport system significant improvements have to be made:
The vehicles:

- Low floor in 95% of all buses and trams on the main lines;
- special reserved seats in the front of the vehicle, near the driver; and
- a fare ticket system that makes it possible to quickly reach the seat without too much distress.

The drivers:

- Special education for all drivers in order to make the key groups feel safe during the whole trip but also to make sure that the reserved seats are used for those in need;
- interchange locations:
- strategically chosen changing points have to be found all over the city;
- the distance between the two vehicles should not be more than 25-30 m; and
- there is a need for some sort of restroom with access for this group, only were it is possible to easily reach the booking terminal by phone.

Policy implications

None.

Project contact

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–	Integration of Multi-Modal Reliability in the Assessment of Transport Schemes (STP 14/6/12)	UK	Policy features; Organisation features

Key findings

The project outputs are:

- A version of value stream mapping that considers environmental impacts such as emissions;
- the most appropriate supply chain performance measures for sustainable distribution such as emissions per item;
- development of Overall Vehicle Effectiveness performance measure (OVE);
- simulation models to evaluate the impact of demand amplification on transport including the application of ICT developments;

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- tools to improve the interface between manufacturing and distribution to increase the efficiency of both domestic and international transport;
- different methods for integration of transport in supply chains including VMI and FGP; and
- a cost model was produced and developed into the LEFT2 GB strategic freight mode choice and generation model, which was used to estimate 2010 effects of five scenarios identified by ITeLS.

Policy implications

Alternative strategic tools include the establishment of transport networks, the creation of seamless operations and transport process flows; vendor managed inventory and the collaborative planning and management of transport. The research suggests that these strategies often involve collaboration between customers and suppliers – transport should not be seen as a consumable, but instead as part of the overall service package to the end customer.

Project website

www.rmd.dft.gov.uk/project.asp?intProjectID=10038

–	Measuring Demand for an Integrated Inter-Urban Public Transport Network (STP 14/6/16)	UK	Infrastructure features

Key findings

The project outputs are:
- Identification and assessment of 'ideal' inter-urban public transport networks;
- enhanced understanding of the determinants of the catchments of stations;
- development and calibration of a fresh cross-sectional rail demand model; and
- specification and evaluation of a national, regular-interval, coordinated timetable.

Policy implications

Various exercises within this project have demonstrated that there is no intrinsic reason why public transport in Britain cannot be operated on the same principles as the Swiss system. The model was used to forecast the change in patronage following recasting of the East Coast time table. It was found out that the introduction of a Taktfahrplan would increase rail traffic. The aggregate appraisal found that revenue and user benefits would amount to about £23 million. Given the low market share that rail holds on non-London routes the large benefits they would yield could have implications for the relative priority of projects in the context of the Government's environmental and social objectives.

Project website

www.rmd.dft.gov.uk/project.asp?intProjectID=10047

–	TSE Outward Facing Research: Managing Integration	UK	Infrastructure features, Information technologies

Key findings

A very wide range of work has been carried out. Outputs have included the following:
- In the area of 'Appraisal', production of the DMRB-GOMMMS Bridging Document, Strategic Plans for Accessibility and Integration, updated guidance on RMS, and research reports considering valuation of environmental criteria, accident rate prediction and regeneration issues.
- Development of guidance in relation to design issues, including four documents relating to Non-Motorised Users (NMUs) for inclusion within DMRB.
- Guidance and research reports on environmental issues, including a compendium of \'green bridges\'

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and other activity to support delivery of UK biodiversity targets and COST341.

- Feasibility studies for trials of park-and-ride and related initiatives on or adjacent to the HA network, as well as guidance for HA staff on these issues.
- Development of an on-line guide to freight for HA staff.
- Development of guidance on involving the public in transport decision-making.
- Feasibility studies to investigate the impact of educational travel on the HA network, and development of guidance for HA staff on school travel issues. Some of the above activity lends itself to further work beyond the end of the commission, often due to the need for documents to be taken through a lengthy approval process.

Policy implications

Numerous brochures have been written to assist in disseminating Highways Agency policy and Practice in the area of integration.

Project website

www.ha-research.co.uk/projects/index.php?id=629

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