Towards Passenger Intermodality in the EU. Report 2: Analysis of the National Inventories on Passenger Intermodality

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Towards Passenger Intermodality in the EU

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Analysis of the National Inventories on Passenger Intermodality

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Executive Summary

Context of the study

The study "*Towards Passenger Intermodality in the EU*" (02/04-01/05) has been commissioned by DG TREN to support the development of its policy on intermodal passenger transport. The first phase of the study was a comprehensive literature review with a focus on European research (ILS/Babtie/LV/ETT 2004). The here presented report is the output of the second phase of the study and gives an analysis of the existing policies, frameworks and practises in 28 European countries and Japan in order to identify promising models for action and recommendation at a European level. The aim of this inventory phase was to enrich the first analysis phase of the project and its sources with information and analysis on the national level. Both analyses give input to the third phase of this study which will formulate recommendations on passenger intermodality for long distances and cross-border transport (both including the “last urban mile”).

Methodology

In order to organise and administer the national inventories in the 29 countries in a common and structured way, the consortium agreed upon a national inventory along three products or outputs: for each country a country report, an assessment file and summaries of selected national material were produced.

The ***country report*** is written by each country’s national expert, structured along three domains with 14 categories of issues:

- context: (1) the market, (2) assessment and evaluation, (3) policy and politics, (4) legal and regulatory framework;
- products and services: (5) networks and interchanges,(6) information, (7) ticketing, fares, booking and payment, (8) baggage handling, (9) highly integrated products/services;
- planning and implementation: (10) planning, (11) co-ordination and co-operation, (12) promotion, (13) resources and (14) technical issues.

As a way of guiding the writing of the country report, each category was introduced by a short text explaining the main contents and scope of the category and describing shortly the key issues related to it. Next to this, also a list of questions was formulated in order to focus the national expert on the information requested: asking for a description of the status of intermodal passenger transport, of good examples as well as bad practice, factors of success, barriers and recommendations.

A second element of the national inventories are the ***assessment files***. These files consist of a limited number of open questions as well as a small pre-structured questionnaire asking the experts for an overall assessment of the status of passenger intermodality in the country analysed.

The third and final element of the national inventories are the summaries of the most interesting ***national sources*** that were used to produce the inventories. The result is an extension of the list of European references already compiled in the first

analysis phase with more than 70 national references. These new references are gathered in a separate annex to this report.

The national inventories were carried out by the consortium partners and a network of 13 subcontractors. The subcontractors are considered as experts with respect to passenger intermodality within their country. The result is that more than 100 interviews have been conducted with national key persons and more than 400 bibliographic references have been used to realise these country reports in the 29 countries.

General conclusions

In most countries, intermodality hasn't been a focus until recently and some countries are still in the phase of an unimodal focus on improving infrastructure. The inventory revealed that knowledge on the market for intermodality for long distance travel is rather poor. At the national level, little attention is given so far to the study of this market and its potential. Nor is much information available on the possible impacts of intermodality products and services through cost-benefit analyses or impact assessment studies. Nevertheless, intermodality is becoming a greater topic and consequently viewed with greater importance. The subject is generally mentioned in policy documents but implementation continues to be lacking in many areas. The first step in improving passenger intermodality is to raise the political awareness towards the importance of intermodality. In some European countries this condition is already fulfilled, but in the new members states of the European Union e.g. the political will is often not very strong. For them, their first concern is the construction of good basic infrastructure.

Co-operation is essential for the optimal development of long distance passenger transport, especially as many stakeholders are involved. In the countries looked at, there is generally no specific national or regional intermodal strategy. Similarly, at this moment no central independent institution or structure is responsible for the co-ordination role in long-distance intermodality - which is a barrier to the development of a platform for data exchange between stakeholders, an integrated timetable and ticketing system and other structures of importance for passenger intermodality. The national legal and regulatory frameworks in place are incapable to impede the possible negative effects of the liberalised market. Although co-operation between competing companies seems difficult to achieve, it is unanimously considered a prerequisite to a fully integrated transport network. A co-ompetition (co-operation and competition) is possible in certain market environments if a win-win situation can be created. A regulatory and legal framework is needed to give incentives for co-operation. But concepts in this field are widely missing, so that research regarding this topic would be important.

One of the key issues that have arisen from many of the country reports is the subject of international borders and cross-border travel. The lack of interoperability and co-operation across the border is a major barrier in Europe. It has been stated on numerous occasions that regional cross-border travel should no longer be considered as international travel. Cross border transport is even a weak point in countries with otherwise strong internal public transport networks.

At this moment in time, there are not many intermodal products and services that are highly integrated. However, this report gives an idea of initiatives that are at the forefront of what is possible in intermodal passenger transport. Some of the best examples of intermodality can be found between the air and rail industries. The realisation of innovative solutions requires the involvement of many stakeholders and

considerable investments are needed. But apart from these highly integrated products there are developments in many areas, e.g. information or ticketing that can be a basis for further integration.

The best examples of intermodality are to be found in urban regions, at national and regional airports and at High Speed Train stations. The technology to provide a high-quality passenger information, ticketing and booking/payment systems is available. A group of forerunner countries proves that also organisational issues can be solved to implement such systems. However, it also becomes clear that within Europe, the current state of passenger information systems is very heterogeneous and in large part still unsatisfactory. The integration of timetables in particular requires greater co-operation and co-ordination between transport operators and providers. The national inventories show clearly that in most European countries data sharing is a difficult and sometimes sensitive topic regarding the aforementioned aspects. There are only a few countries where a legal framework requires all operators to deliver their timetable and fare data to a central database or to make it accessible through a network that is used to provide integrated information.

New technologies like smart cards, GSM technology, internet applications give important opportunities on several fields of intermodality (e.g. ticketing and information). However this opportunity can be a barrier because of different technical standards. It is important to work towards an integration of the different technologies and standards.

Recommendations

The first report of the study already listed possible priorities from the perspective of influence that can be generated from the EU level. These possible action fields concern measures regarding regulations, funding, standardisation activities, research or the exchange of best practice. Through the analysis of the national inventories the importance of these topics could be verified and filled with more details and some rough recommendations. This will also guide the study during the next phase, which will elaborate in greater depth the recommendations and proposals highlighted for the European Commission.

1. Introduction

1.1 Aim

This report is the output of the second phase of the project '*Towards Passenger Intermodality in the EU*', It gives an analysis of the existing policies, frameworks and practises in 28 European countries and in Japan. The aim is to identify promising models for action and recommendation at a European level. During the months of May, June and (beginning) of July 2004 a survey amongst these countries was conducted to compile all relevant national information. The consortium partners and a network of 13 subcontractors carried out these national inventories. In the map below, the 29 countries are presented together with the name of the consortium partner responsible for the inventory. A complete list of subcontractors of each consortium partner is given in the annex to this report. The subcontractors are considered as experts with respect to passenger intermodality within their country. During the month of July, all this national information has been analysed.

The aim of this inventory phase was to enrich the first analysis phase of the project and its sources with information and analysis at the national level. This first phase (conducted in February to April 2004) focused on European research and policy about passenger intermodality. As a result, a large number of issues have been identified in connection with intermodal passenger transport. The *national inventories* were structured along the same issues within the three domains as the ones defined within the first analysis phase, as follows: (1) *context* or framework conditions for realising passenger intermodality, (2) *products and services* linked with passenger intermodality and (3) *planning and implementation* issues.

The national inventories deliver a structured overview of passenger intermodality, with information about its strengths and weaknesses, good and bad practices; an overall assessment is asked for as well as information on interesting national material (such as studies, laws, products etc.) that could feed in at the European policy level. The information was not meant to serve as a comparison between countries, it has been analysed along certain themes and practise and policy examples have been extracted from many of the participating countries.

1.2 Methodology

In order to organise and administer the national inventories in the 29 countries in a common and structured way, the consortium agreed upon a national inventory along three products or outputs: (1) a national or *country report* structured by the three domains (context, products & services and planning & implementation, (2) an overall *assessment file*, structured by a number of questions and (3) s*ummaries* of selected national material. For each of these 'products', specific templates were set up to assist and guide the national experts.

Comprehensive ***country reports*** of 15-20 pages were required from each country expert. These were structured into the aforementioned three domains (*context / products and services / implementation*), which are in turn divided into a total of 14 categories. These 14 categories or thematic areas cluster all related issues.

As a way of guiding the writing of the country report, each category was introduced by a *short introductory text* explaining the main contents and scope of the category and describing in brief the relevant key issues. A list of *questions* was also formulated in order to focus the national expert on the information required: these typically asked for a description of status, good examples as well as bad practice, etc.

A *combination of different methodologies were suggested* with aim to provide information about the national situation, such as own expertise, analysis of available literature, analysis of other material (e.g. leaflets, presentations, unpublished documents, policy documents, legislation, etc.) and expert interviews (personal interview, telephone interviews). As a result more than 100 interviews have been conducted with national key individuals and more than 400 bibliographic references have been obtained and used in a total of 29 country reports. The list of interviewed key persons and national bibliographic references are found in the annex[1].

[1] The 29 national reports themselves are not published.

Domains	Categories of key issues
A. Context	1. The market
	2. Assessment and Evaluation
	3. Policy and Politics
	4. Legal and Regulatory Framework
B. Products and Services	5. Networks and Interchanges
	6. Information
	7. Ticketing/Fares, Booking/Payment
	8. Baggage Handling
	9. Highly Integrated Products/Services
C. Planning & Implementation	10. Planning
	11. Co-ordination and Co-operation
	12. Promotion
	13. Resources
	14. Technical issues

The second element of the national inventories is the ***assessment files***. These files consist of a limited number of open questions as well as a small prestructured questionnaire asking the experts for an overall assessment of the status of passenger intermodality in their country. The results of this exercise are illustrated in tables in the annex. It has to be stressed that the viewpoints and assessments of the national experts can not be completely objective. The assessment tables need to be viewed with this in mind.

The third and final element of the national inventories are the summaries of the most interesting ***national sources*** that were used in producing the inventories. The result is an extension of the list of European references already compiled in the first analysis phase with more than 70 national references. A separate not published annex comprises of all the national material on passenger intermodality.

1.3 The rest of the report ...

In section 2, a thematic analysis of the national inventories is conducted across the 29 countries. The analysis follows more or less the 3 domains and 14 categories of issues or thematic areas relating to passenger intermodality. For each category (subsection 2.1 to subsection 2.14), the analysis and its reporting is structured into six parts:

- a small introduction, based on the conclusions of phase 1 of the study *(subsections 2.X.1)*;
- state of the art, with a description of the current situation of the category and its issues in the various countries of the inventory *(subsections 2.X.2);*
- selection and short descriptions of good practices *(subsections 2.X.3*);

- overview and description of main factors of success (*subsections 2.X.4*);
- overview and description of main barriers (*subsections 2.X.5*);
- short category conclusions and recommendations (sub*sections 2.X.6).*

The thematic classification into 14 categories does not mean that a cross categorical analysis is neglected as they all are closely interlinked. This broader approach is specifically considered whilst drawing together the conclusions in section 3. In this third section, the assessment of the national experts (input from the national experts in the assessment files) is compared with the conclusions from the cross country category analyses in chapter 2.

Section 4 comes up with the main recommendations from the national inventories. It refers to the possible scope of intervention on an EU level in the field of passenger intermodality that has already been identified in the first report. Fields that open options for European action are filled with recommendations from the national inventories and are the basis for the last phase of the study.

2. The Status of Intermodal Passenger Transport

Context

2.1 The market

2.1.1 Introduction

A profound picture of the market for passenger intermodality, its strengths and possible barriers covers the following issues.

Information about the modal split, travel behaviour with regard to intermodality. Information about the market share for trips of long distances (>100 km) is far from well documented: knowledge is available on travel motifs (business, recreation, etc.) as well as on the main transport modes used. However, the combined use of different modes for long distance trips is less well known, with the exception of the fact that the 'unimodal car trip' is most preferred.

An analysis of the market weaknesses of intermodal travel. In order to improve the position of intermodal travelling in the market, one should be fully aware of the current weaknesses of passenger intermodality. E.g. mode transfers often result in a loss of comfort and/or time, they can also involve higher costs of transport infrastructure. A good documentation both on real disadvantages as well as on perceived disadvantages is required.

Knowledge on the different market segments for intermodality. A well-focused promotion of intermodality requires a good knowledge of target groups with a high potential for change; this should include their preferences and behaviour. Detailed data is often lacking and does not arrive at such a qualified market segmentation. What is the importance of the business traveller, the long-distance commuter, the weekend recreational, the foreign traveller and regional cross border markets? These are some of the important questions that need to be answered.

Modal conflicts because of differing operator priorities might inhibit the development of high qualitative passenger intermodality. The reason might be the varying commercial requirements of operators (e.g. seats are more lucrative than cycle space in train carriages.); long-distance travellers are often considered as relatively unimportant for urban operators. In some cases, there are urban losers and national winners or vice-versa (e.g. urban car connections to the inter-city travel network are discouraged by local transport operators as they go against urban sustainability and are considered as competitive with their own services).

The development of the market and the demand for intermodal passenger transport is influenced by several *societal mega-developments* at the European and national level. Two such important driving forces that need a mention are: the demographic change and more concretely the ageing of the population leading to different travel patterns and specific requirements with respect to intermodality. Another driving force is technological progress, this can open opportunities in terms of comfortable intermodality.

2.1.2 State of the art

From the national inventories we learn that the knowledge about the market for passenger intermodality is rather poor. 18 out of 27 national experts[2] assess the data availability of and knowledge about the market for passenger intermodality for long distance trips in their country as (rather) a barrier. For 7 other country experts this issue is seen as a factor of success or rather facilitating.

In most countries data on *long distance trips* are available or could be derived from national travel surveys. However, there is often a lack of interest in the long distance passenger market. In some countries borders are never far away (as in Belgium, Slovenia, Luxemburg, Baltic states). Moreover distances between the main conurbations are often less than 100 km and passenger mobility between the rural areas and main cities is very poor (e.g. in Ireland, UK). The trend of urbanization in some countries (e.g. Bulgaria) will in the future boost transport further in larger agglomerations and this will make the transport network even weaker in the sparsely populated areas.

In the larger countries (e.g. Germany, Spain and France) the analysis of the market for long distance passenger transport (>100 km) has received much more attention. Some smaller countries have adopted another definition of Long distance trips. E.g. in Switzerland a long distance trip is considered as a trip followed by an overnight stay. In the Netherlands, the break has been put at the distance of 50 km. The focus of interest in some countries has been exclusively towards tourism trips (e.g. in Austria). Most details about the long distance travel market in Europe are obtained from the European DATELINE project with individual information on 15 EU-countries. The results of this project have been treated more extensively in report 1 of this study[3].

Data on *intermodality* in the long distance passenger transport market are even less easy to find. Some studies point out that only a small percentage of all trips are intermodal but that in fact these intermodal trips account for a bigger share in kilometres travelled. At this moment intermodality is only debated in large metropolitan areas where concerns are directed at urban and suburban commuter trips instead of international cross-border traffic.

Overall, there is very little knowledge available in the 29 countries in terms of *the market segments* for intermodal transport in long distance trips. Some countries (e.g. Austria) have collected information on tourism mobility to specific regions. In most countries, individual transport operators conduct regular measurements of customer preferences, attitudes and satisfaction. However, this information only covers the use of one mode and is often treated as confidential.

The elderly person market segment may be of particular interest. The national inventories point out that only in a few countries, *the mobility patterns of ageing people* have been studied in depth. National experts admit that the elderly person market is growing very fast and therefore definitely needs more attention in transportation policy as it also needs more attention in other policy domains (e.g. Italy and Japan). Whether, this growing group will be translated into a growth in the market for long distance passenger intermodality is however not so obvious. Elderly people

[2] An assessment of the national experts of Latvia and Malta are missing.

[3] Towards Passenger Intermodality in the EU, Analysis of the Key Issues for Passenger Intermodality, report 1.

conduct a smaller number of trips per person. The trip distance for elderly people is also relatively shorter. And last but not least, a growing part of this (older) market segment has a driving licence.

It is a fact that this target group has several special needs and requirements that have to be taken into account in future investments in passenger intermodality. In the UK, a qualitative DfT-funded research programme based on focus group conversations is a good example of the way the needs and requirements of this target group have been gathered. Here and in other studies (e.g. Austria and Germany), the following issues were revealed:

- the importance of accessibility at interchanges (more specifically the accessibility on foot is important due to problems with steps and limited access for wheelchair users e.g.);
- the lack of staff that can help elderly people at an interchange is seen as a weakness;
- security and safety issues are getting more importance (e.g. the train is not favoured by elderly people due to overcrowded stations);.
- the need for better information systems.

Apart from the ageing population, other megatrends cited by national experts are the following:

- the expansion of low budget airlines (e.g. Czech Republic) and the steep growth of air travel for long distance travel (e.g. Ireland).
- the economic growth has in some countries lead to a boast in mobility demand and an enormous growth in private car use; as a result governments are investing a lot in extending and improving road and public transport networks with only a small focus towards intermodality between different modes. The opening of the transport market to competition is a particular topic in the Eastern European Countries, this factor is not facilitating the 'intermodal thinking' process.
- In some countries the political debate on 'passenger intermodality' remains somewhat in the shadow of the debate on 'freight intermodality'; this is especially the case in countries that aspire to be an important distribution platform (e.g. Belgium).
- the urbanisation trend is mentioned by several country experts as a factor that is putting the political focus of the intermodality debate exclusively in the metropolitan areas.

2.1.3 Selection and short description of good practices

We would like to discuss the results of two studies relevant to the long distance passenger intermodality market; namely a market study from 2002 in the Netherlands and the INVERMO-project in Germany.

In the Netherlands good data on intermodality and modal split for long distances are available due to regular national travel surveys. Also the market potential of intermodal passenger transport, its strengths and weaknesses have been studied in depth (Dutch Ministry of Transport, Public Works and Water management, (2002)).

The SWOT-analysis revealed that the biggest potential of passenger intermodality is situated in urban regions with already large shares of passenger transport use, on long distances (!) and on relations with voluminous traffic flows. Large transfer nodes can generate incomes to compensate for costs. Individual costs for the passenger can get to competitive levels if at the same time road charges are implemented. The main weaknesses to overcome are disadvantages relative to the car (comfort, reliability and travel time), the lack of cost effectiveness of intermodality investments and the multi stakeholder environment. Opportunities are evident through the strengthening of bike and car position in the trip chain, the introduction of the Dutch chip card, the development of mobility packages and through the improvement of ICT in information supply. Tendering procedures, the trend of decentralisation and the market mechanisms are considered both as an opportunity and as a threat. On the one hand, decentralised decision making is an opportunity as it gives birth to local initiatives and products/services that are highly based on good knowledge of the user needs. On the other hand it leads to fragmentation and makes standardisation difficult. The introduction of competition is an opportunity as it is per definition more 'market' and thus 'passenger' oriented and leads to more efficient solutions but it should be supported by institutional rules that enhance co-operation between transport providers. An important tool within this respect are the tendering procedures, these should give transport providers the right incentives.

In the German INVERMO project, (Intermodal Network Integration) travel behaviour and user demands are considered as well as market potentials for intermodal measures. A mobility panel set up in 1994 was used as a tool to generate the empirical data material for long distance transport. The trips were evaluated including all modes from door-to-door. The empirical data was used for the creation of a task sensitive model of user demands. The intrapersonal and situation based results of the analyses were also taken into account. The generation of empirical data was accompanied by the screening of 10.000 long distance transport interviews. The results highlighted an imbalance of transport demand in the long distance market, only 1 % of the population makes 10 % of all long distance trips and 10 % of the population make 43 % of all long distance trips. The knowledge of this imbalance is important for encouraging intermodality in accordance with user demands. Two main market segments were defined: persons who travel long distances for private reasons and seldom for business (71 %) and those vice versa (17 %). With regard to intermodal travel, about 60 % of the long-distance travellers have a monomodal travel pattern, 75 % of these using only the car. The other 40 % travel multimodal. In general not even 25 % of all respondents have considered alternative modes before the journey. The multimodal group is highly mobile and could be the target group for intermodal products and services. The study concluded that multimodal travellers are the spearhead of a changing market. To provide them with truly integrated services will be the challenge for transport professionals. On the other hand, the large group of monomodal car travellers must provide the most scope for significant modal shift to more sustainable intermodal combinations. (Last, 2003; Last and Manz, 2003).

2.1.4 Overview and description of main factors of success

National travel surveys that are updated on a regular basis give important insights in modal split and market potentials for intermodality.

Good management by the national authorities lead to complementarities between operators and fair competition between transport modes.

New ICT-developments are likely to improve the attractiveness of the market for passenger intermodality in the future. If at the same time, car use is made more expensive (e.g. with kilometre charges that internalise external costs), the price of an intermodal long distance trip will be more accepted.

2.1.5 Overview and description of main barriers

As the market for passenger intermodality in long distance trips is relatively small, there is a lack of political interest to invest in better understanding and measures that promote passenger intermodality.

In some Eastern European countries low income still restrains people from travelling. From the beginning of the liberalisation the regular scheduled transport has undergone economic losses and a shift from public transport to individual transport has been experienced. The rapid liberalisation did not guarantee equal competitive conditions. These countries evolved from a hyper centralised economy to an open market with a lack of legislative frameworks. The market driven model can cause service and mode competition and conflicts between operators and authorities. Conflicts between operators may arise with data sharing and changing schemes. Lines can be cut on the border of concession zones. Some public transport enterprises have a monopolistic position.

One bad example of operators satisfying their own targets was given for Great Britain: Oyster Card ticketing system within London and the One-Ticket scheme in South East Scotland. Train operators have chosen not to be included in the schemes because setting up and administration of each scheme would incur costs. This results in supposed area-wide schemes that do not cover the whole area.

2.1.6 Short category conclusions and recommendations

At this moment in time, there are countries that do not even poses basic information on the passenger transport market; e.g. data on the modal split are missing in Bulgaria and the Czech Republic. An overall picture of the transport market based on regular analysis of national travel patterns however is crucial to steer and plan transport investments from a multimodal demand perspective.

In countries that do have good data on modal split by means of national surveys, we see that the long distance traveller is often not considered an important market segment to focus on, except in some larger countries. Smaller countries are lacking knowledge on cross border traffic. European or transnational projects such as the German INVERMO-project that builds on panel data are promising; they will provide greater knowledge regarding long distance passenger trips.

Little is also known about the combined use of different modes in long distance trip chains and the market segments for intermodality. At this moment, each operator studies his own market and the needs and requirements on the combined use of modes are missing. A national funded research program and a national co-ordinating body could overcome this sectoral thinking.

The ageing society stresses the attention needed towards improved accessibility at interchanges. For this market segment, tourist trips are the main focus.

Nowadays the focus on intermodality continues to be narrowly focused on metropolitan areas rather than on cross-border traffic.

In the East European countries, reformation has had a big influence on the economic situation. It is evident that these countries need good management by their national authorities.

2.2 Assessment data on passenger intermodality

2.2.1 Introduction

Cost-benefit analyses can serve to back up specific policy aims and to create a priority list of possible actions. The topic however is complex and many questions arise within this context that cannot be easily answered since necessary data, methods and case studies are still unavailable for many important fields. Among the most important cost benefit issues for intermodal passenger transport is the general question of which modes or mode combinations in an intermodal travel chain should be promoted when considering the *true costs* (inclusive external costs[4]) of transport, and on a more specific level the evaluation of concrete costs and benefits of certain intermodal investments against those of single mode infrastructure investments.

Furthermore, the quantification of benefits of intermodality enhancement measures is difficult beyond measures of user satisfaction and willingness to pay for services. Benefits of measures such as information and baggage services are often qualitative and thus hard to quantify. Until now, existing standard assessment methods are unsuitable to bring intermodality measures into mainstream investment planning.

2.2.2 State of the art

In most of the 29 countries looked at, there is no tradition of systematically making cost-benefit assessments for transport investments. Here and there, something starts to change. In Spain for example, the government recently requires a Cost-benefit (C/B) assessment for all transport investments. However, clear guidelines on the way these should be conducted are missing. As a result C/B exercises are mostly partial, only focussing on a few impact indicators s.a. environmental impact. In other countries (e.g. Ireland and Japan), the government has set up guidelines on how to conduct C/B-analyses for transport investments. But so far, these guidelines have not been adopted and used in the assessment of investments in passenger intermodality. In Ireland, these assessments have usually been conducted for road investments.

In Austria and Great Britain, cost-benefit studies have been conducted to support important investment decisions in specific transport corridors and transport modes. Also in the Netherlands, an assessment of investments at transfer points is currently being undertaken. Although not directly related to intermodality products and services and to long distance travels, these investments are crucial links for the realisation of passenger intermodality. In France a national research program PREDIM subsidises research that aims at building assessment instruments for intermodality.

[4] The European Environment Agency mentions as external costs: environmental costs, urban separation, non-covered accident costs, congestion, non-covered infrastructure costs, fragmentation of landscape, land-take and ecological separation.

Cost-benefit assessments have also been undertaken for specific intermodality projects such as AIR-RAIL projects (connection of a railway station with the airport) in Germany and France. In the particular case of Germany, different C/B-studies have been ordered by each stakeholder/investor individually. Results of these studies are confidential and the approach is far from integrated as they are conducted from a private profit point of view. Within the VIENNA-spirit project (Austria), a user acceptance assessment of an integrated information system has been conducted with promising results.

2.2.3 Selection and short description of good practices

An interesting example to mention is the assessment of passenger intermodality is Japan.

In Japan, manuals for long-distance passenger transport are made in order to estimate cost-benefit of projects including port/airport improvement and transportation terminal developments for urban regeneration. Indicators are developed on users' benefits, suppliers' benefits, environment improvement benefit, cost, evaluation indices for railway projects and indicators on station plaza development benefits, benefit of exclusive pedestrian routes, and cost and evaluation indices for urban regeneration.

The Japanese Ministry of Land, Infrastructure and Transport (MLIT) has developed the "National Integrated Transport Analysis System (NITAS)", based on the understanding that it is important to quantitatively, analyse and evaluate the status of transportation systems and effects of network formulation, and then to visualise those results. NITAS can search the shortest required time, cost, distance by means of transportation within any two zones (from mesh data either 1 km or 10 km, or local municipalities) in the country. It is also possible to take a cross analysis with other national statistics such as the Population Census, the Census of Manufacture, or the Census of Commerce.

The TransPrice project in Greece investigated a transmodal integrated pricing and financing regime for urban transport based on a modal split at which the total generalised costs of both public and private transport are minimised. A comprehensive impact assessment of integrated pricing/payment scenarios was carried out.

2.2.4 Overview and description of main factors of success

Cost-benefit studies are an important instrument in making investment decisions. The AirRail project in Germany has proven that intermodality investments based on cost-benefit studies by all stakeholders can lead to a win-win situation.

Cost-benefit analyses of infrastructure investments in major links and interchanges ordered by the government, have proven to be important in building a strong basis for future investments in intermodality products.

2.2.5 Overview and description of main barriers

At this moment, there is still no tradition of conducting cost-benefit analyses for transport investments in most of the countries looked at. Most of the time, governments don't take the initiative for their own investments and/or they don't require C/B-exercises from private transport investors. Often, there is also a lack of guidance on how to conduct C/B-analyses.

Another barrier is that the characteristics of intermodality investments don't make C/B-analyses an easy topic. First of all there is the fact that knowledge about the market for intermodality (see subsection 2.1) and its future development is rather limited. As a result also the 'benefits' part of the C/B-exercise remains blank or at least very risky.

Secondly, if one considers that these uncertain benefits have to be distributed among many stakeholders, it is not so unusual that only a few examples of C/B-analyses on intermodality investments exist.

2.2.6 Short category conclusions and recommendations

In some countries cost-benefit studies are made on a project basis but not for integrated networks. Important barriers are the absence of an overall tradition of CB-analyses in transportation investments, the lack of crucial data on the market for intermodality and the multi stakeholder nature of such investments. At this moment, there is no set of monitoring indicators on intermodality available. Some countries developed a manual or guidelines on impact assessment but such an instrument should be available on a European level.

In order to enhance the use of C/B-analyses in intermodality projects, national governments should invest more in collecting basic information on mobility patterns.

The role of Europe could be to build up a set of monitoring indicators for C/B-analyses and impact assessments. This European guidebook or manual should offer a broad set of qualitative as well as quantitative indicators to assess both the process and impact of intermodality investments. It should be illustrated by good and bad practices with an analysis of factors of success as well as factors of failure.

2.3 Policy and Politics

2.3.1 Introduction

The following issues describe possible barriers caused by prevailing policy and politics.

First of all there might be problems of political will and lobby for intermodality. The concept of intermodality in itself hasn't got any natural seat of advocacy at any level beyond Ministries and thus is in a difficult position to gain political and financial support.

A balanced approach to all sustainable modes might be inhibited by the *dominant strength of the public transport sector* over walking and cycling, which has less advocacy outside of formal policy. As a result of this, opportunities for walking, cycling and even urban car use within intermodal systems are not as developed as they should be and are often suppressed when perceived as costly or competitive (e.g. bicycles on trains).

There might be a lack of national and/or regional policies/priorities with regard to intermodality. Policy stances on long-distance intermodal transport are often vague and inhibited by the lack of market data collected or available, which does

not enable a quantitative discussion on the potential benefits of investing in intermodality over other options (e.g. against expensive investment in high speed rail).

Preferred modes and mode combinations. e.g. is the car - rail combination (especially to P+R) something that is actively facilitated as a realistic high impact option? If so in what circumstances? What about continued expansion of low-cost flights from smaller, less accessible airports: so far there seems to be no clear policy stance on how to deal with the urban externalities caused by this new phenomenon. For what trips can rail be required to compete with air as long distance mode: High speed rail versus standard rail versus air travel for medium-distance journeys?

Problems of policy inconsistency. The optimal transport network and interchange policy requires a balance between urban and national travel policy in order to ensure direct rail connections to city centres without disturbing urban-land use plans. This balance has not and is not always achieved. E.g. one region or state might support rail whereas a neighbouring region or state supports road.

2.3.2 State of the art

Three issues related to policy and politics and their enhancing effects towards passenger intermodality have been asked and assessed by the national experts (the questions are listed in the table below)[5]. The picture of the countries is diverse but promising.

Expert assessment on following issues .	(rather) factor of success	(rather) a barrier	difficult to say
1. Political will and lobby for intermodality	15	12	-
2. National and/or regional policies & priorities regarding intermodality	15	12	-
3. Policy consistency	11	14	2

The majority of national experts state that the political will and lobby (rather) favours the development of intermodality (15 of 27 national experts). The same degree of favour is true for policies and priorities. The majority of experts see policy consistency as more a barrier to passenger intermodality (14 out of 27 countries).

The list of countries can be split up in three more or less equal sized groups: with an overall *positive* 'policy and politics' image, a more *moderate* image and a *negative* image. It's however impossible to highlight any special pattern of opinion between North-South or East-West differences. The first group contains eleven countries: Germany, France, Norway, Sweden, Finland, Switzerland, Austria, Luxemburg, Poland Estonia and Italy. We get a more moderate image from the countries in the second group; Denmark, Belgium, Great Britain, Slovakia, Portugal, Bulgaria, Czech Republic, Lithuania, and Hungary. The remaining seven national experts highlight a rather critical attitude towards political will and policy; namely Ireland, Spain, the Netherlands, Japan, Greece, Romania, and Slovenia.

[5] The expert assessments for the status of intermodality in Latvia and Malta are missing.

Within the first group of countries, it is worth mentioning the case of Austria. Austria pays special attention to passenger intermodality, this is widely shown through the non-legal commitment expressed in the "General Transport Plan" (GVP – Ö) from 2002. Some of the measures being implemented, such as transport corridors and interchanges, are developed from an intermodal perspective. As an example, Vienna's new transport Master Plan already embraces passenger intermodality improvements. The city has already got important intermodality connections, such as the air-rail option to the airport.

The Danish case is very similar, aspects of environmental and passenger intermodality form an important part of Transport Policy and the issue is very commonly discussed in relation to commuting. The situation in Great Britain is also very positive, as the government has already issued policies recognising the importance of intermodality, through various white papers from 1998 and 2000. Another important step forward was the creation in 1998 of the Commission for Integrated Transport (CfIT), established to promote the integration of measures when acting as a government advisory body. Through policies like ticket integration, interchange improvement, the introduction of Traveline and the improvement of traveller information, the government has shown its support for intermodality, the only restraint has been budgetary limitations.

In some Central European countries like Germany, for example, there is a clear political will stated in numerous documents highlighting a clear interest in promoting passenger intermodality. However, no measures have been implemented, apart from short term pilot projects. Local experts have concluded that integration of modes is the way forward, but unfortunately political actions are lacking as a result of financial and revenue sharing issues. Those countries with the will and political compromise that could progress intermodality share the financial limitations that hinder the implementation of measures and improvements.

In Spain, politicians are only now starting to seriously consider the topic of passenger intermodality. The Infrastructure Plan (2000) for the period 2000-2007 did not set out any policies with regard to modal integration, nor did the 2007-2013 Plan, which continued to focus on large scale development of long-distance road and rail links, high speed rail networks; and failed in the provision of intermodality considerations. Only now, the Intermodal Plan of Transport Services and Infrastructures launched by the new government, which will be submitted to the Parliament not later than ending 2004, has begun to recognise the importance of intermodality. This Plan is a major step forward that may lead to future political consensus on the issue of passenger intermodality.

Even worse is the situation in countries like Greece. Here there are no policies set out by the Ministry of Transport, mainly due to the lack of knowledgeable people within the Ministry on such issues. Furthermore, priorities remain at the moment with the building of new infrastructure, especially roads. Matters are also hindered at the regional level where there are no possibilities of development, as all major decisions are taken by the central government. Public awareness of these issues is practically non-existent. Although intermodality was a main policy reference for the railways, airports and public transport operational programme, no specific measures have been taken to date. In Estonia, for example, political understanding of passenger intermodality is completely new. There are vague long-distance intermodal transport policies. The balance required between the urban and national travel policy to ensure direct rail connections to city centres has not been realised as yet.

2.3.3 Selection and short description of good practices

Political will and lobby for intermodality

Intermodality is an important part of transport policy in Denmark, reflecting the strong political will that exists towards reducing the environmental impact of transport. Although Denmark does not have a legal or regulatory framework, there are various documents and papers that reflect that intermodality issues are a priority for the transport authorities. An example of such documents include a document entitled ”Mobility that creates value” from the Ministry of Transport (2002), and a document by Jens Peter Bach, from the Traffikministeriet.

The publication of the integrated transport White Paper in Great Britain in 1998, demonstrated the commitment of the government to an integrated and multimodal transport system. Amongst other things, it resulted in the establishment of Local Transport Plans and the Commission for Integrated Transport (see national key players subsection) (Department for Transport 1998). The five year LTPs in 2001 have resulted in better thinking of integrated transport at the local authority level.

In Switzerland, although there is not a strong co-ordination or integration policy for passenger intermodality at the national level, it is a topic that has become increasingly integrated into existing policies and structures in Switzerland, reflected by many activities in politics and research in this area. For example, the current national research programme “Sustainable Transport” (2004-2007) includes the “Promotion of Intermodality in Passenger and Freight Transport” as one of the five main fields.

Policies and strategies favouring or hindering intermodality

In Austria, the General Transport Plan 2002 sets out the national transport policy. The network approach of the plan considers six main transport corridors and seven important interchanges. The transport corridors are being developed with an intermodal perspective, with consideration given to intermodal system benefits as part of infrastructure investment (GVP-Ö 2002). Connections to neighbouring countries are an important issue under current transport policy, reflecting the geographical location of the country and increasing traffic flows associated with the enlargement of the EU.

In Finland, although a single concrete intermodal strategy does not exist, the 2002 strategy document Public Transport – An Attractive Alternative (MTC, 2002a) does contain a number of measures seeking to improve intermodality, partly in support of it’s aims to make public transport an attractive alternative to the car for long distance journeys. Measures directly related to intermodality improvements focus on new public transport interchanges, although these are supplemented by measures to improve travel information and integrate modes e.g. a national information system, compatible sub-systems, door-to-door services, and feeder connections to long distance rail and coach transport.

The national mobility plan for the City of Luxemburg and surroundings aims to achieve a significant change in national mobility behaviour, including:

- Public transport modal share of 25 % by 2020 (currently 11.5 %)
- Integration of mobility in urban planning, especially the public transport network
- Integration of the cross-border rail network, motorways and airport

The strong point of the plan is that it is intermodal and collectively addresses transport at the local, regional, national and international levels.

Transport policy documents in Lithuania and Poland for example make explicit references to the need for improved intermodality. Earlier this year, the strategy for the development of Lithuania's transport sector until 2028 was published by the national Ministry of Transport and Communications. This included passenger transport intermodality as one of it's objectives. Measures set out include the integration of external and internal passenger transport services by linking external passenger terminals (air, river, ports and rail) with the internal/local transport systems. It also includes reference to pedestrian and cycle ways and bus-based park and ride services.

Preferred modal combinations

In Bulgaria, various good examples of transport schemes exist in relation to the following modal combinations: air – long distance coach; high speed train – cross border coach; and, express train – fully accessible bus. Other schemes such as the express train – special bus for handicapped persons have been adopted thanks to the European Union, who provided funding under the Pilot Project for transporting handicapped people under the PHARE programme. In conclusion, financial restrictions and insufficient supply of services hinder the integration and implementation of other measures, such as the addition of destinations along rail lines.

In the Netherlands, a system of "Transferiums" is promoted which combine car and high quality public transport, through a system similar to park and ride, which also caters for bike-public transport. Ten locations were chosen for the schemes. Although they focus on urban area trips, they can also be used for long distance journeys.

National key players, power and position

In Luxembourg, various organisations were established a few years ago to foster long distance and cross border passenger intermodality:

- Rhealys S.A. is an association between CLF, SNCF, DB and SBB (Luxembourg, French, German and Swiss railway operators respectively) established for the purpose of conducting market studies in relation with the TGV-Est-High speed rail line from Paris, with a branch-service to Luxemburg and, later on, with a through service of Luxemburg – Strassbourg – Basel. It's mission is to provide technical harmonisation and promotion of interoperability (CFL, 2002. p. 57)

- CFL – Immo S.A is a company managing the railways estate (stations, yards etc.) and local planning around stations (CFL, 2002. p. 56). With this instrument the partners in planning (state, CFL, bus operators, towns, etc) can realise coherence between architecture, functions (space) and the intermodality (the networks of all modes, especially the interconnection with walking).

In France, the fact that the SNCF is the only rail transport operator facilitates the rail integration at the international, national and regional levels, since co-operation between the national transport authorities and a unique transport operator is undoubtedly easier than in other cases. However, it may also result as an obstacle, given that being the only operator in the country acquires more power and wields pressure, as no competition is encountered.

In Great Britain, the Commission for Integrated Transport (CfIT) was established in 1998 as an independent body to provide independent advice to the Government on the implementation of integrated transport policy, including passenger intermodality in its remit. It has made some good progress in areas of research and influencing government policy. The British Airports Authority (BAA), a private company owning several of the UK's major airports including London's Heathrow, Gatwick and Stansted, is a key player in the formulation of national transport policy, influencing the recent draft national airports policy for the next 30 years.

In Switzerland, the general public forms a significant key player in the development of passenger intermodality, since an element of the Swiss policy system is the participation of citizens in political decisions in the form of referendums. These have often been held regarding questions of transport policy, both at the national and regional/urban level. There is also the transport association VCS (Verkehrsclub Schweiz – Transport Club Switzerland) which has a strong influence on government decisions.

2.3.4 Overview and description of main factors of success

A main factor of success, very generally, appears to be the population density of the area. The political will for passenger intermodality improvements, along with the subsequent development of strategies, is stronger in urban areas, and also in countries such as Great Britain and the Netherlands, which have high population densities. In these areas, the transport network is under more pressure and environmental and social concerns are often higher.

The existence of independent (i.e. non-government) national key players, - such as the Commission for Integrated Transport in the UK - and the active involvement of residents in the decision-making process, also appear to be a positive factor in developing support for passenger intermodality. The existence of research programmes in this area also seems to be significant.

2.3.5 Overview and description of main barriers

Possibly the greatest barrier is that there remains a fairly strong sectoral thinking in transport policy, focusing on the individual modes, and a strong focus on infrastructure spending, in addition to poor public awareness of the issue of passenger intermodality. In Germany for example - as in other countries - there is currently no position within the ministry responsible for intermodality and there is no strong lobby for passenger intermodality.

The undertaking of all major transport decisions at the national level in some countries does not allow regions to promote particular modes or mode combinations. Related to this are conflicts of competence or/and priorities between regional and federal levels of government, including in some cases unclear division of responsibilities. There are also conflicts regarding financing. In Belgium, there is a political unwillingness to share infrastructures on less used local rail lines. Here problems arise when the national and regional governments do not agree on issues like infrastructure sharing, interoperability, etc. An example of the problems are the delays of urban and region rail services on the tracks of NMBS around Brussels due to organisational issues, whilst in Spain there are some conflicts over the national/regional role of new high speed rail lines. In Spain, it relates to political conflicts between the regional and national governments, because while the national government has

focused on providing direct routes between key cities, the regional governments have sought only to include regionally important locations on the rail networks.

The structure of transport policy at the national level may not assist, for example in Spain, where the responsibility for road infrastructure and road based transport services come under different secretariats of the national transport ministry.

Creation of a new body responsible for all public transport services can be hampered by fears of losing power and legitimacy in implementation and regulation amongst the various key players. This is the case in France, where the regions are responsible for interurban rail and road services, whilst the city conurbations deal with public transport within their territories.

The lack of intermodal travel data available in this area makes it difficult to discuss (let alone quantify) the potential benefits of different intermodality measures required for the development of national or regional policies.

2.3.6 Short category conclusions and recommendations

Generally no specific passenger intermodal strategy is in place at the national or regional level, and similarly no single institution is responsible for the co-ordinating role of long-distance intermodal transport. It is evident that support for intermodality that does exist tends to be concentrated in metropolitan and larger urban areas. Conflicts between stakeholders and policy inconsistencies often relate to funding issues between different levels of government.

In the new member states of the European Union the will for passenger intermodality is generally even less evident. Rather, attention and priorities are more focused on: the availability of transport funding, the lack of or the poor quality of existing infrastructure, the rigidity of current public transport management and operation (especially, the need to open up the market), a lack of information relating to travel patterns and needs, and increased travel demands associated with economic growth and neighbouring countries.

Key players generally include the national government along with principal transport operators, especially national rail and air.

The research has suggested that clear support for passenger intermodality at the national government level, backed up by clear integrated transport policies and strategies are initial prerequisites for improvements in the passenger intermodal sector. Furthermore, the establishment of a key independent organisation responsible for undertaking research, promotion, and for leading concepts is strongly recommended, especially in the context of an increasingly liberalised and disaggregated transport network.

2.4 Legal and Regulatory Framework

2.4.1 Introduction

The prevailing legal and regulatory framework might favour or inhibit the development of passenger intermodality. The following issues might be important.

Impact of competition models. In competitive regulatory environments with several operators, intermodality might be inhibited if there is no contractual or regulatory obligation to co-operate. This applies to all aspects of integration. A specific problem might occur for urban railways operated by national railway companies which compete with urban public transport modes and also for the co-operation of rail (especially high speed rail) and air operators where short-hop trips are profitable.

In a number of countries and at the EU level, *anti-monopoly laws* can prevent close co-operation of private sector activities, which might lead to effective "cartel" status. Without suitable legal exceptions, this can cause major problems for attempts to create seamless intermodal systems, especially integrated products.

Institutional aspects of data sharing. Fully inclusive data provision to intermodal information providers is needed for consistent and comprehensive services. Data sharing might be a problem when it relies on voluntary sharing between institutions. The thinking of the operators as data owners is often proprietary and protective. When the private sector is involved in using public data, there are sometimes difficulties with data quality, exclusivity agreements, unrealistic pricing and cultural clashes between public service and profit motivations.

2.4.2 State of the art

In most of the countries studied there are no laws that explicitly regulate intermodality nor co-ordinate competition models to force intermodal co-operation. In general, the situation is equal in most of the European countries and Japan. Countries like Estonia, Romania, Lithuania, Latvia, Poland or Greece have no law whatsoever that relates to passenger transport intermodality. And not only are they lacking regulations, but also there is a lack of awareness on the topic of intermodality. Cases like Bulgaria, Denmark, Italy, Spain, Portugal, the Netherlands and Belgium do not have specific intermodality laws in place but authorities have stated interest in the issue through different public documents, where there is recurrent support for intermodal integration actions, although little has been done in practice.

Attention is drawn to a couple of countries where there are no laws treating integrated mode-use or no legal sticks in place to force intermodality. However, there are special laws that support and ensure the rights and equality of handicapped and visually impaired people.

The most positive picture is in Ireland, Switzerland, Luxemburg, Japan, and France. In France, for example, there are several Acts fostering intermodality (SRU Act, Urban Regeneration and Solidarity, Dec. 2000), it offers the possibility to create a SRU-partnership and gives the different authorities the opportunity to co-operate within wider territories, and levy additional transport taxes, which are exclusively used on passenger intermodality schemes.

The national experts have been asked three questions relating to the legal context. A general assessment has been requested on whether each of these topics are favouring or hindering improvements in passenger intermodality (see the list in the table below)[6].

Expert assessment on following issues .	(rather) factor of success	(rather) a barrier	difficult to say
1. The impact of competition models	3	17	7
2. Institutional aspects of data sharing	5	18	4
3. Institutional aspects with regard to co-operation	10	15	2

The institutional aspects with regard to co-operation are considered as a barrier in the majority of countries (15 of 27 countries); there are a few optimistic cases to mention: Ireland and Finland, where, competition is viewed as an effective way to improve public transport standards, an example of this is the creation of a bus services franchising in Dublin. One of the goals of the Irish Department of Transport is "to enhance the efficiency and effectiveness of the transport systems delivery through competition, economic regulations and structural reform of state agencies". In the case of Finland, the government is against forcing co-operation and prefers voluntary co-operation. Instead of legally forcing intermodality co-operation, the Ministry for Transport and Communications is co-funding development programs to promote co-operation on ticketing systems. Other favourable situations are reported for Switzerland, Italy, Denmark, the Czech Republic, Luxemburg, Estonia, Romania and Spain

The majority of the national experts consider the impact of competition models in their country as a barrier. However, within 7 out of the 27 countries the situation is difficult to assess. In many countries there are no laws regulating the co-ordination of competition models that may force intermodal co-operation. As a general rule, the topic is starting to become more important and better understood. However, governments are beginning to show interest in the co-ordination of intermodality issues, as reflected by many of the Transport Plans issued lately. Such is the case in Spain, where the national government's election campaign document "Intermodal Plan of Transport Services and Infrastructure" (PSOE 2004) does make references to the new legislation and regulations to improve the integration of transport services and to improve collaboration between the different stakeholders, which should tackle some of the issues that have hindered intermodal integration up to this moment. Although there is no legal framework for co-ordinating intermodality nor for co-ordinating intermodal co-operation, except in the region of Madrid, measures exist in larger metropolitan areas through the establishment of transport consortiums.

A positive and quite optimistic situation observed in countries like Switzerland, as previously mentioned, was the infrastructure plan (Sachplan Infastruktur der Luftfahrt) which clearly states principles for the connection of airports and may even impose requirements regarding model-split facilities to promote intermodality. In the Czech Republic, there are no specific laws, the government has realised the impor-

[6] The expert assessments of the status of intermodality in Latvia and Malta are missing.

tance of integration and this has become a hot issue, and the Czech public policy and legislation explicitly supports integrated passenger transport systems through a national methodology for developing integrated public transport systems.

The institutional aspects with regard to data sharing are in most of the countries seen as rather a barrier (15 of 27 countries); there are a few optimistic approaches, as reflect in cases such as Bulgaria, Belgium, Czech Republic, The Netherlands and Italy.

In principle many countries confess that obtaining data on interchanges, schedules, revenues, lines, occupancy, demand, etc, is usually a problem. The confidentiality of the data favours the attitude of most of the operators who fear competition when disclosing information. In many cases there is no authority requirement to co-operate with the private sector on the collection and exchange of data, and there is no institutional space for data collection activities in the private sector. The use and requirements of proprietary traffic and travel data to achieve a higher level of co-operation on the interconnection of transport databases does not exist. This is the case of the Slovak Republic, where the experts express the need to create a legal and institutional environment with several possibilities on how to invite the private sector into traffic data collection, processing and distribution, together with the definition of the rules, responsibilities and co-operation between public and private sector in the Road Act.

2.4.3 Selection and short description of good practices

Laws or regulations regarding intermodality

In Bulgaria, the Ministry of Transport and Communications is currently preparing a development strategy for the transport sector up until 2015, one of the principal elements of which is to develop passenger intermodality, and to establish the legislative and regulative norms.

One area where legislation is in force relates to journeys by mobility impaired individuals, including the elderly. In Germany, the design of interchanges have to provide for the needs of such travellers although at present many stations do not fulfil the conditions of barrier free access for mobility impaired people and improvements need time to implement. In Japan the Traffic Barrier-free Law seeks to ensure the spatial mobility of this group. This stipulates systematic and integrated approaches to the issue, and requires the co-ordination of improvements between all levels of government and transport providers. The municipal government formulates a master plan for the area around a central railway station. Thereafter, the systematic and prioritised barrier-free development must be carried out accordingly with aim to improve passenger facilities. This systematic approach would address issues at nearby roads and alleys, on the station plaza and at other relevant structures or facilities in the vicinity.

Luxemburg has a law from 2003 in which one of the seven issues handled is the adoption of an integrated approach for the organisation of rail and road public transport services integration at the national, cross-border and inter-local levels.

In Ireland, competition is viewed as an effective way to improve public transport standards, an example of this is the creation of bus service franchising in Dublin. One of the goals of the Irish Department of Transport is “to enhance the efficiency and effectiveness of the transport systems delivery through competition, economic regulations and structural reform of state agencies”. In the case of Finland, the gov-

ernment is against forcing co-operation and prefers voluntary co-operation. Instead of legally forcing intermodality co-operation, the Ministry for Transport and Communications is co-funding development programs to promote co-operation on ticketing systems.

Legal frameworks for co-ordinating competition models to force intermodality

Although there is currently no relevant legal framework in Bulgaria, new legislation or modifications to existing legislation is planned to co-ordinate competition models in a manner that will favour intermodal development.

In Slovenia, although there is no legal framework to enforce competition, within the bus sector a kind of regulated competition exists, whereby the bus services co-ordinated with railway schedules are excluded from some rules.

Legal sticks to force intermodality (in planning and operations)

In Denmark, an example of how intermodality is part of the concrete transport policy are the contracts between the Ministry of Transport and DSB with respect to DSB S-train. These contracts state that the stations (which are owned by DSB or DSB S-train) shall be adapted, so they have the best possible functions for the passengers, among other things in relation to a) intermodality between train and car/bicycle/bus, b) waiting facilities on the station, c) information systems, d) ticket purchase, and e) facilities for disabled people.

In Japan, it is legally required for railway operators to encourage adoption of measures to facilitate transfer for passengers, according to the Railway Law. This includes the direct operation and platform sharing between different railway companies so that the passengers can transfer more smoothly and easily.

In the Netherlands, rules for co-operation between operators should be integrated in the tendering conditions. Regions can do a lot via these conditions, although up to now there isn't much experience of intermodality benefits achieved through these.

In Switzerland, the federal government establishes principles for the connection of airports to public transport in its plan for air infrastructure. Furthermore, it is possible for the government to impose requirements regarding the modal-split for certain facilities. An example is Zurich Airport, where for the fifth construction phase, the airport was required to increase the modal share of public transport arrivals from 34 % to 42 %, albeit mainly to reduce congestion on the surrounding road network. The airport achieved this.

Data sharing

With regards to data sharing, it is worth to mention the good practices that have been identified in the national inventories. Among these is Bulgaria, with a comparatively good system for data sharing. Here the main data sources for the different types of transport are the National Institute of Statistics and the Executive Agency with the Ministry of Transport and Communication, who is responsible for data collection and processing of real indicators. Information is provided through the websites of the operators, websites of branch organisations and specialised sites by topic. Although in Bulgaria there are no legal barriers as far as data access is concerned, certain restrictions apply as regulated by the Protection of Classified Information Act (2003), and affects only state and official secret data or classified information. As a future measure, it is planned in the long-term to introduce a statistic

system covering all transport sectors, and harmonise it with EU and international organisations and unions requirements. In Finland, for example, the provision of information is encouraged by the Ministry of Transport through Research & Development funding programs.

Data exchange between operators is common in Belgium. The rail trip planner from NMBS (ARI) (The Belgian Railway Company) contains data from the different operators (NMBS, MIVB/STIB, TEC, etc). However, experts state that the ever increasing competitive environment will make it more difficult to obtain integral timetables and network data files from operators, specially for revenues and vehicle occupancy related information.

In the Czech Republic, the Transport Act of 1998 provided the regulatory basis to centrally collect quality timetable information. They set up the electronic National Public Transport Schedule Database (CIS). The Ministry of Transport provides rights to the system manager for resale of the data collected and acts as the sole obligatory recipient of timetable data from operators.

As previously mentioned, The Netherlands is also one of the few countries where there is a law that regulates the centralisation of data in OVR9292. In Italy, there are several systems of data gathering, but there is not a real system for data sharing at the national level. Data owners are requested to send data to the National Institute of Statistics.

The Ministry of Transport and Communications in Finland has the right to obtain information from the operators about the economy and passenger volumes for planning, statistics and surveys. The provision of information is encouraged through R&D funding programs.

2.4.4 Overview and description of main factors of success

Regarding regulations at the European level, it seems that to guarantee equal investments in public transport, public authorities have to guarantee that in the design of concessions and tendering there are no isolated public transport offers. Instead only offers focused on the integration of systems should be developed.

Transport operators should be legally required to encourage the adoption of measures that facilitate transfer of passengers and cargo. For this reason, laws to promote co-operation among transport operators are highly beneficial and improve and facilitate transfer stations. It is crucial that operators are willing to share market knowledge, because if this is not the case, information sharing and discussions among operators are very limited. As it is inherent to intermodal passenger transport that many stakeholders and operators are involved in a competitive environment. To avoid contra productive situations (e.g. no data sharing between different transport operators) it is vital to have legal or regulatory frameworks that oblige to co-operate.

2.4.5 Overview and description of main barriers

In some countries, there is a belief that the free market is best positioned to provide good practice in passenger intermodality. In Great Britain, the Office of Fair Trading (OFT) applies competition law to the bus industry, particularly through the Competition Act 1998 and the Transport Act 2000 (and Transport (Scotland) Act 2001), which seek to prevent anti-competitive behaviour of bus companies. The consequence of the legislation is that if operators reach an agreement on co-ordinating

their services but have a combined market share of 25 % or more, this would be seen as anti-competitive and would not be permitted. Furthermore, ticketing schemes between bus operators will often breach the Competition Act 1998.

Meanwhile, in Germany, tension between the opening of transport markets to competition and the necessary co-operation between transport operators act as an obstacle against the achievement of a seamless travel chain. Currently it seems that integrative forces of the market are not sufficient to guarantee co-operation of transport operators in the field of integrative and intermodal transport services, which is a danger for sustainable transport system (Schöller and Rammler, 2003).

The rigidity of the transport legal framework is sometimes a deterrent to the realisation of passenger intermodality. In Spain, for example, four different classifications of bus services exist. The regulations prevent the use of certain services (e.g. work or school) by general passengers, which is a barrier to mobility and thence intermodality particularly in rural areas, where they may be the only transport services in operation.

A result of the regulated-privatised system philosophy in place, as in the Czech Republic, is that usually only services which require subsidy (i.e. the loss making services in the public interest) can be significantly influenced.

In Estonia and Latvia it is considered that a legal framework to co-ordinate competition is obstructed by problems such as, attracting financial capital to establish a company, and corruption within administrations.

Tendering processes for public transport services further hindering passenger intermodality. Since EU regulations encourage the acceptance of the cheapest bid, opportunities for innovations like intermodal products, which can increase the quality of a transport service considerably, are lost. An additional and interconnected barrier is the short length of tenders which does not encourage operators to invest in ideas and to develop concepts that result in better performances in the long term. The Netherlands have a five year tender period for bus services.

The bus network in the UK (outside of London) is provided within a deregulated environment, where operators are free to introduce (and withdraw) services with the minimum of formality (42 days notice). This encourages competition where there is a substantial existing market and leaves many areas outside the main settlements without a commercially-provided service. Furthermore, cross subsidisation by more profitable routes is not permitted and new developments are vulnerable to competitive action.

A further barrier is the management and control of public transport services by various levels of administration. In Spain for example, barriers arise due to the award of concessions for urban, interurban and long-distance bus services, being split between urban, regional and national authorities respectively. Each authority defines specific stopping places, fares, and indicative timetables/frequencies according to the characteristics of each service. Therefore, services that originating from outside the urban area may not have permission to pick-up or set-down passengers at urban bus stops (other than a terminal), or may be required to charge higher fares for local passengers, or may have separate stops.

The Greek long distance passenger road transport is essentially closed to competition and the same holds for the rail network, which is operated by a single operator. The air sector is open but the entry requirements are high. The only transport mode

that is in reality open to competitions is sea transport, where the market was fully liberated only at the start of 2004. There are no legal obligations for co-operation between operators and there are no legal barriers to any kind of co-operation. There are no incentives given to inter-city bus operators to co-operate. Also, the existence of one or two dominant players in each sector does not help co-operation between any of them.

2.4.6 Short category conclusions and recommendations

The national inventory has found out that there are no current laws or regulations in place across Europe that treat intermodality as a general measure. Nevertheless, legal frameworks in place for individual transport modes do indirectly seek to improve intermodal travel characteristics.

In general, there are few legal frameworks in place to co-ordinate competition models for longer distance journeys. This is in spite of the increasing requirements for co-ordination resulting from the opening of transport markets to competition and privatisation of this sector.

Although it is generally the case that specific legal sticks to intermodality do not exist, these appear to be increasing with the privatisation of bus and rail operators. This is the case in Finland, for example, where operators can arrange integrated ticketing systems, which allow a less strict interpretation of the competition laws. In general, agreements on prices between firms are not allowed according to the competition laws.

In many of the new member states of the European Union, the focus of transport development is still on improvements to basic infrastructure, and consequently laws and regulations have not yet been prepared to cover intermodality.

It is recommended that framework conditions, set by the government, to give incentives to transport operators within liberalised markets should be established, along with the development of concepts in this area.

Products and services

This domain 'products and services' is structured along four main categories: networks and interchanges, information, ticketing/fares and booking/payment and baggage handling. Examples (good or bad practices) that combine two or more of the four categories are described under the category 'integrated products and services'.

2.5 Networks and Interchanges

Networks and interchanges refer to three key issues:

- the level of integration of networks and their **interoperability**,
- the **design, lay-out and functionality of interchanges** and
- the **integration of the transport services** such as timetables

For each of these key issues, we give a short description followed by a table with all important aspects to look at in detail. Note again that there has been looked at all these issues for as far as **long distance travel** is concerned.

The tables provide a qualitative assessment indicating the general status of networks and interchanges in the 29 countries examined. As each country report is written by an other national expert the qualitative assessments are not perfectly comparable with each other but the tables give a global view on the situation of the different investigated key issues on networks and interchanges. The Annex is also giving the overview of this assessment process.

2.5.1 Integrated networks, interoperability

2.5.1.1 State of the art

The status of interoperability of different mode combinations can be looked upon in depth analysing the different topics in detail. We asked the national experts for a 'general status' of the integration and interoperability of the networks leaving details or local exceptions aside as much as possible. They could answer on a 4-point scale poor/rather poor/rather good/good. If the interoperability of networks gave a rather diffuse image, they could tick a box 'don't know'. The assessments of the national experts of the 27[7] countries gave the following scores.

[7] For the assessment of Networks and Interchanges Malta and Estonia are missing

Current status of development ...	(rather) good	(rather) poor	don't know
1. the technical interoperability of rolling stock and infrastructure in rail services (train/metro, high speed train-low speed, international train).	11	15	1
2. the quality of the access of cyclists to long distance travel and international travel in the transport infrastructure – parking bike, taking bike on trip or bike hire/public bikes	11	15	1
3. Facilities of car park and ride / kiss and ride facilities for intermodal long-distance travellers	15	11	1
4. The Integration of ferry and river transport	6	9	12
5. The emergence of budget flights, and (often poor) intermodal integration/services of regional airports	4	20	3
6. The integration of cross-border regional transport systems	10	14	3

The table shows that the status of technical interoperability of rail infrastructure is mostly considered as rather poor or poor by the national experts, with significant room for improvement in many countries in Europe. The situation with regard to the access of cyclists to intercity and international travel is fairly evenly split between poor and good, although it seems that most countries could do something to improve the situation. There is particularly good access for cyclists in many northern European countries, particularly parts of Scandinavia and certain parts of Germany. Bicycles are not normally allowed on the TGV in France or the bullet train in Japan.

The table shows that the status of integration is at this moment most developed between car and other transport modes. 15 from the 27 countries assess the status as rather good to good. On the other hand, in an absolute majority of the countries looked at, a lot of work is still to be delivered in integrating services at regional cross-border level. The status of the integration of regional transport systems across European borders remains fairly split, with around half of the national experts responding with good/rather good and around half with poor/rather poor.

However, although roughly only half of the national experts responded with rather poor/poor in the majority of examples, there is clearly much work that can be done to improve the situation of integrated transport networks and interoperability across Europe. For the countries with lesser developed integrated transport networks the task ahead is very different to those with well-established and developed networks. For these countries the task to improve services will be complicated, such as Great Britain where the existing network is highly complex and often over-loaded. Even for countries where the perception of services is good, such as the integration of cycling in Denmark, it is noted that cycling parking is over-loaded and therefore has room for improvement.

2.5.1.2 Selection and short description of good practices

The examples of good practice are categorised under a number of sub-headings which are closely linked to the subject areas in the assessment tables

Rail networks

Luxembourg is a good example of technical integration and interoperability. DB, the SNCF and NMBS/SNCB all share tracks in Luxembourg even though they all require different types of overhead cable and power supply (resp. 15.000 v AC, 25.000 v AC and 3.000 v DC).

In the Czech Republic, all international, national long-distance, regional and suburban trains use the same infrastructure. There are also planned tram-trains (light trains) in the Liberec region, which will be able to use their own infrastructure as well as railways infrastructure and there is a project entitled 'RegioTram NISA' encouraging cross-border travel between Germany and Poland.

A good example in Germany of an interoperable transport system between urban and national rail exists in Karlsruhe, where urban trams can run on the same railway lines as those used for regional train services. This links the city centre with the outlying region without the previously needed change at the main railway station that is located outside the city centre. This so-called Karlsruher Model has been quite successful and can be found in use in other cities as well.

Although in many senses Japan has a two-tier train network, with Shinkansen (bullet trains) and conventional rail operating concurrently, there are efforts underway to link Shinkansen to conventional rail lines, involving the alternation of the gauge of the conventional line. This is hoped to have the effect of increasing the usability of conventional railways and cut the journey time between areas currently not linked by Shinkansen.

Integration of bicycles and cycling

In Denmark there are excellent cycling facilities, due to the number of bicycles and the popularity of cycling and further reinforcing and encouraging it. Every day in Denmark around 20 percent of the population use bicycles, and as such bike and ride facilities are very important, with around 47,000 bicycle parking spaces available in the Greater Copenhagen area. However there is still an acute shortage of bicycle parking in the centre of Copenhagen and other districts. Bicycles may be taken on most trains (but a reservation is required during the summer months) and the Metro in Copenhagen for a small fee depending on distance. In Denmark, particularly on the Island of Zealand, there is a good provision of park and ride facilities, mainly for those commuting to Copenhagen.

As mentioned, bicycles can be taken on-board many trains across Europe although the situation varies considerably from country to country. For example, in Austria bicycles can be taken on-board many local and regional trains, as well as on long-distance and selected international trains to various countries. Many stations in Austria have bike and ride facilities, although criticism has been voiced that there is a fee to use bicycle lockers whereas parking a car in a park and ride is generally free. However, when bikes are not allowed on trains this becomes a barrier, see barrier section.

Another good example of public transport intermodality from the Netherlands is the 'OV-Fiets' (Public transport bike). The classic rent-a-bike formula serves primarily

tourist and recreational uses and the renting process can be slow. With OV-Fiets the system is much easier and quick, and is considered as a comfortable and unbounded extension of the rail trip. The user should have a free OV-Fiet permit (€10), and renting costs €2.75/20 hrs or €27.5/month with payment received automatically via bank account.

Many major cities and terminals across Europe also offer repair facilities for bicycles. For example around 100 stations in the Netherlands offer 'Rijwielshop Fietspoint' where repairs can be conducted during the train trip, and around 100 stations offer bike hire facilities.

A system of 'urban bikes' is being introduced in Oslo, up to 1200 bikes by May 2004, and will be open to citizens and foreigners alike. There are around 40 planned bicycle racks, of which around a third are finished so far, and these are placed at key traffic and transport terminals in the centre of Oslo. To use the bikes it is necessary to subscribe and pay a small annual fee of 50Nkr (€7). When subscribing you receive a season card, which is used to unlock the bicycles. Each individual bicycle can be used for a maximum of three hours, and they can be taken and left at any of the racks.

Another innovative service offered in Germany is Call-a-bike, undertaken by DB Rent, which is available in some major cities such as Berlin, Frankfurt, Cologne and Munich. Rental bicycles are available to local users but also for long-distance passengers, for example it is possible to rent a bicycle at a major train station in Berlin and take it one way to the destination, leaving it at a significant point like a crossroad near the destination in a defined area. You need to reserve and book it and check where you leave the bicycle. Call-a-bike currently has around 50,000 clients. Andreas Knie who developed the services for DB Rent, estimates that approx. 400,000-500,000 people would be willing to use such services immediately, and sees a long term potential of 3-4 million clients. He sees the services as complement to urban transport and long distance transport chains.

Park and ride car parks in Prague offer free use of cycle lockers for a small deposit. There is also bike hiring facilities at certain railway stations in south and east Bohemia in the Czech Republic for a relatively small fee and deposit, with the possibility of returning the bicycle at a different station to where it was hired and with free bike transit on the connecting trains

Park and ride & kiss and ride

Many countries have similar park and ride facilities, however, they are generally designed and managed for short distance commuters. The Prague park and ride facilities are enclosed and supervised during the day. 24 hour parking is available for a fee, however, at night cars are locked within the enclosure and facilities are not manned.

Cross – border integration

The areas around Salzburg or Lake Constance are very good examples of transnational co-operation, with the Salzburg public transport association including parts of Germany in an integrated ticketing scheme. It has been stated throughout the country reports that cross-border regional transport should not be viewed as international travel and that cross-border links should be developed.

Only one low cost airline operates in Slovakia, SkyEurope, providing regular flights from airports at Bratislava and Košice. A bus shuttle is available from the urban centres to the airports in both cases, and SkyEurope operate a bus shuttle from the centre of Vienna with Bratislava airport to connect with flight departures. There are no plans for a airport rail link in either case, but there are plans to connect the cities of Vienna and Bratislava by a tram or train link although plans are very much in their early stages.

2.5.1.3 Overview and description of main factors of success

Many countries have a strong and affluent 'know-how' and 'can-do' attitude towards public transport within Government, the academic world and amongst the general population. For example, in the Netherlands the Dutch people are often aware of mobility problems within their country, and in Switzerland the size of the country and the efficient administration opens itself to a more integrated approach to transport planning which is an important pre-condition for the realisation of intermodal measures

Taxation can also have an effect on car ownership, and so indirectly on integration of public transport networks. In Denmark cars are heavily taxed and so car ownership here is the lowest in the European Union. However, high taxation is a very controversial 'stick' towards encouraging public transport use and is closely linked to political governance and policy. It is also most effective and least controversial when combined with high-investment in public transport and reduced costs for public transport use.

Countries with well integrated transport networks generally have strong administration and good consistency between policies at a local, regional and national scale. This is true in a number of cases, including Austria, Switzerland, and the Netherlands. The inverse is also true, whereby countries without a strong and consistent transport policy and administration across all scales often lack in integrated transport provision (see below for greater detail).

Due to Belgium's central location at a cross-road in Europe with many international functions and an urbanised nature, the country has become a good 'breeding ground' for intermodal concepts. Belgium is considered best able to cope with its unique position by offering and succeeding with good intermodality projects.

2.5.1.4 Overview and description of main barriers

There are many barriers to developing an integrated and interoperable transport network, including problems of finance and politics through to geography, history and culture.

Throughout much of Europe and around the world in countries such as the Netherlands, Great Britain and Japan, public transport operates in a deregulated environment, which can act as a barrier to quality, sustainable and intermodal transport. The long-term investment required for integrated and intermodal transport is harder to finance, as the deregulatory belief that if intermodality is really the solution, the demand for it should automatically create the funds for its supply. All initiatives that don't match the target of being self-supporting are given less credibility. The deregulation of the bus and rail operations and the complexity and uncertainty associated with the management of the rail infrastructure is clearly a barrier for improving intermodality opportunities. Furthermore the related competition issues often hinder organisations that are willing to consider initiatives towards improving intermodality.

The lack of one main rail node in many European cities acts as a barrier to developing a well-integrated transport network. This can be seen in the case of Vienna where there is no clear main rail node, and for other cities such as Dublin and London. In Dublin the journey between the two main rail stations currently involves a bus connection, and in London involves navigating the Underground between as many as six major 'over-ground' rail nodes. The Underground can be forbidding to many groups in society, particularly the elderly who are not familiar with it.

The relative youth of the transport market in places such as Bulgaria acts as barriers to the implementation of intermodality, with insufficient knowledge about intermodal practices and the continuing privatisation of transport services. These countries will need more time to adapt to new social and political orders, and currently do not have the financial resources to fund the necessary improvements in basic infrastructure. In the case of Bulgaria, there is also a large number of private operators who are not sufficiently aware of the possible co-operation with competitors and the potential benefits this can achieve. These countries will potentially benefit the most from the experience of the rest of Europe.

In many countries, such as the Netherlands, bicycles are welcomed on board trains outside peak hours. However, this is no longer stimulated as there are too many bicycles on the trains. Different train operating companies in Great Britain have different policies on bicycle carriage and cost. Many countries don't allow bicycles on trains during peak travel periods. In some countries such as Japan and France, bicycles are generally not allowed on long-distance train services due to lack of capacity, and when such bicycles are carried they are required to be reduced to component parts.

Certain European countries such as Greece and Ireland simply do not have the population, geography and finances to justify and operate a well integrated transport network. In the case of Ireland, although the geography of the country is not forbidding for public transport the majority of the population occupy the eastern seaboard of the country and as such a well integrated and interoperable country-wide network is difficult to establish.

For countries with numerous international borders, particularly small countries such as Belgium, the number of international borders presents a complicated and expensive problem of interoperability. The costs and burdens of non-standardised products, rolling stock, systems etc are great and can be prohibitive to developing an effective cross-border transport network.

Different track gauges in different countries present barriers to successful integration of transport services, for example the track gauge in Finland is different to that in Norway and Sweden, and between Sweden and Denmark there are two different power and ATC systems, two security systems and drivers need to be licensed to drive trains in both countries. The gauge is also different between France and Spain and Hungary and Ukraine as well as between many other countries in Europe, and passengers either have to change train or travel on specially adapted trains with variable gauge.

A barrier also exists in terms of policy in Ireland, and in other countries to a lesser extent such as Greece and Slovakia. Although there are high-level policy initiatives to promote integrated public transport networks, the primary focus and impetus still rests with road construction and bringing the Irish road network up to Western European standards. Many feel that the current road network is insufficient and therefore cannot justify or consider intermodality issues until it is complete, although

this is countered with the argument that Ireland's public transport network should be improved parallel to the road network, to prevent an even greater road dependent society from developing.

Cross-border regional transport systems in Spain are often poorly integrated, and again are very much related to the division of responsibility for intra-regional and inter-regional services lying with the autonomous community and the national government respectively.

Problems and barriers also relate to the different planning policies between regional and national governments. In Spain, for example, the Catalonian regional government (Generalitat de Catalunya) have been pressing for a spur of the proposed high speed AVE line that will link Barcelona with Madrid and other Spanish cities to pass into Barcelona airport. The National Ministry however view the airport as better served by local trains or metro services. There is also poor integration and co-ordination for long-distance/medium distance journeys in many parts of Spain. At Ourense in Galicia long distance bus services use the peripheral bus station which is served by an urban bus line, whilst medium distance services only serve the city centre. Such problems are very much related to characteristics of the regulatory framework, planning and institutional structures.

Similar problems to those experienced in Spain can be found in other European countries. The political structure of Belgium with each region, community and federal government each having strictly definite competencies and tasks make it difficult to plan and develop effective intermodal transport.

There is also the problem of transport cultures. In Spain for example, there is no great cycling culture that can be compared to northern European countries such as Denmark and the Netherlands and as a result cycling facilities are poor. The Spanish policies relating to cycle carriage on trains also vary widely depending on provider and whether they are local, regional or national etc. and this only serves to suppress demand.

Linked to this idea of transport 'cultures', is the need for strong public support in order to succeed with integrated transport initiatives. Although a Government can easily be blamed for lack of consideration and financing of public transport, the people need to provide support and be aware of the need for investment. For example, it is noted that in Slovenia there is little public support and very few lobby groups pressing for better services, cycling rights, 'green' activists etc.

2.5.1.5 Short category conclusions and recommendations

One of the key issues that has arisen from many of the country reports is the subject of international borders and cross-border travel. In many instances around Europe it is currently easier to travel from one side of a country to the other than simply get on a train and travel to a proximate city over the border. It has been stated on numerous occasions that regional cross-border travel should no longer be considered as international travel.

Cross border transport is a weak point in countries with otherwise strong internal public transport networks, such as Switzerland and the Netherlands. In order to improve cross-border travel improved collaboration with the surrounding EU member states and regions is required, and this could be facilitated through EU intervention.

It would be useful if an individual institution were to take on a co-ordinating and leading role with respect to passenger intermodality. Currently several stakeholders

including public institutions, local authorities and operators are responsible and this requires diligent co-operation. This role would be well suited on a high level to a European wide agency, as cross-border and international transport could be co-ordinated centrally. This role would be particularly beneficial to particular regions and states of countries that are strongly decentralised. However, it would be important for this institution not to become just another bureaucratic level in an already complicated situation.

To summarise the recommendations:

- Develop a EU team that specialises and provides assistance with cross-border co-operation and long distance integration of services. The team would also research and collate good practices with aim to standardise practices and technologies.

- European wide guidance on good interchange and facilities. For example, regarding safe secure cycle parking (including overnight), lockers and toilets.

- Develop guidance and present good practices on interoperability, for example tram/train, power supply solutions and signalling solutions.

- Guidance on the planning and locating of new interchanges and integrating/connecting existing transport hubs that are distant from each other and act as a barrier to travel.

2.5.2 Design, layout of Interchanges

2.5.2.1 State of the art

Deficiencies in the design, layout and functionality of interchanges may act as a barrier to intermodality. User needs are well known but often not accounted for properly. The connection of the different modes must permit short transfer times. Serious hurdles are put up if the interchange does not meet the standards with regard to accessibility. But also personal security and comfort needs must be met. The issues presented in the table below are important. Again we asked the national experts to assess the current status regarding each issue from poor/rather poor/rather good/good as far as possible. If the situation is too scattered – which is indeed realistic-, the option was left to tick a box '*don't know*'.

Current status of development ...	(rather) good	(rather) poor	don't know
1. The ease of orientation at point of arrival in an unfamiliar city (sufficient and transparent physical design and information system)	11	15	1
2. Transfer times to other modes within interchange	14	9	4
3. Separation of major long-distance modes to different interchanges (e.g. rail/air) and cross-urban transfer times	10	13	4
4. Passenger transport accessibility of growing regional airports	7	16	4
5. General quality of interchanges (grottiness)	14	9	4
6. Safe, secure and direct walking and cycling access to interchanges including cycle parking and storage facilities	12	15	0
7. Opportunities for high quality use of waiting and transfer time	9	15	3
8. Security real and perceived (against mugging and assault) of interchanges)	16	8	3
9. Accessibility of interchanges and transfers for growing old people market and others with limited mobility	7	17	3
10. Safe, clean, complementary services, quality of waiting areas	15	9	3
11. Child services for parents	2	18	7
12. Kiss and ride. Drop off facilities giving good interchange between private transport and public transport	19	8	-
13. Motorcycles. Facilities to accommodate motorcycles at interchanges. Safe secure parking and storage facilities	4	19	4

From this list of 13 issues it appears that in the majority of the countries analysed, good progress has been made regarding the general quality of the interchanges; more specifically are transfer times to other modes within the interchange good or rather good; so are the real and perceived security of the interchanges, the quality

and comfort of the waiting areas and the rooms are generally indicated as good together with kiss and ride facilities.

In more than half of the countries looked upon, a lot of work continues to remain in terms of passenger transport accessibility of regional airports (as said before);

- the opportunities for high quality use of waiting and transfer times;
- the accessibility of the interchanges and transfers for less mobile people and for people with children (no good practices highlighted);
- the facilities to accommodate motorcycles (safe and secure parking and storage facilities) (no good practices highlighted)

However, at the same time there are many good examples in the inventory to look at and to learn from.

All the countries can be split up roughly into three groups. The first leading group has good or rather good scores on almost or all issues regarding the design and lay out of interchanges. These are: The Netherlands, Germany, Switzerland, Denmark, Finland, Great Britain and Belgium.

The second group of countries show a more scattered image of scores on the 13 issues with good characteristics of interchanges as well as bad ones. These countries are Sweden and Norway, Austria, Ireland, France, Luxembourg, Spain and Portugal, Poland and Japan.

A third group can be called the follower countries at the eastern side of Europe (s.a. Hungary, Bulgaria, the Czech and Slovak republics and Lithuania) and the two southern countries Italy and Greece.

2.5.2.2 Selection and short description of good practices

As stated in section 2.5.2.1 there are some issues in which good progress has been made regarding quality. These are:

- Transfer times to other modes within the interchange;
- The real and perceived security of the interchanges;
- The quality and comfort of the waiting areas and the rooms;
- The kiss and ride facilities.

Transfer times to other modes within the interchange

Short transfer times between points of interchange are highlighted as an important practice and a factor of success. The airports in Zurich and Geneva are well connected to rail and public transport facilities, which reduces cross-urban transfer times. In French cities with heavy systems of public transport (metro, tramway, segregated bus), the main train stations are well connected to the systems, sometimes even being the central points of urban public transport. In many places in Portugal, regional and local bus terminals are located next to railway stations, which allows for short transfer times within the interchanges. Local public transport services are provided as a rule.

In Germany, in order to make changing from rail to air as convenient as possible Fraport constructed a long-distance train station right beside the airport. Passengers have relatively short walking distances to special check-in counters which are

directly located in the railway station and walking distances to the main terminals are relatively short.

Many of the large German airports are already connected to the regional and long-distance rail network (e.g. Frankfurt, Köln-Bonn, Düsseldorf, Berlin), with other important airports being well linked to the regional public transport network. Cross urban transfer times between different interchanges (e.g. airport – rail station by local public transport) are in general satisfactory, while many long-distance trips require transfers only within one interchange (mostly main rail stations, airport).

Timetabling in Great Britain tends to take into account the different modes within an interchange. For example, intercity or long distance train services tend to be timetabled to compliment local services. A good example is the Journey Planner from Transport for London website, where they include the walking or transfer time as part of the journey time.

In Prague (Czech Republic) the proposed New Connection (Nove spojeni) is a project involving rebuilding and modernising the Prague rail junction and infrastructure, enabling all international and national long-distance trains to access the Prague main station as well as urban and suburban services. The development is proposed to be completed in 2008, with investment levels at €333 million.

The real and perceived security of the interchanges

Security of parked bicycles is good in Germany, with Radstationen (bicycle stations) existing in many German cities at the interchanges. Münster has a Radstation that offers parking facilities for approximately 3,300 bicycles, as well as additional services like repair services and rental bikes.

Similarly, in some Swiss cities, Radstationen have been established where bicycles can be parked in a safe environment.

Bus stations at Sheffield and Leeds (Great Britain) have security arrangements and lockers provide secure and weatherproof storage for bicycles.

The kiss and ride facilities

Kiss and ride schemes in France at train stations are generally linked with main parking, but with the possibility to park for free if staying for less than twenty minutes. This is also the case for airports, which also gives the opportunity to drop someone in front of the terminals. The case of Part Dieu train station of Lyon is interesting because one side is accessible by all modes of public transport whereas the other side has got long-term parking, kiss and ride facilities and taxi areas.

2.5.2.3 Overview and description of main factors of success

The location of interchanges and the distances between points of interchange is seen as a factor of success by many countries. In Portugal these short walks take place under covered spaces. Interchange in Denmark is very good as there is only one main rail station placed in the centre of each city connecting bus stop/bus terminal. Inter-regional train lines leave from the same transfer point.

Clean and attractive shopping and eating facilities at train and airport terminals are seen as a factor of success in Portugal, Great Britain and Poland. Laganside in Belfast, Ireland was opened in recent years. It is successful due to having smart and clean waiting facilities, with electronic passenger information systems, travel enquiry

centers, retail outlets and security arrangements. In Britain there are also good examples of child parent facilities as in a number of other countries.

Improving accessibility is receiving funding in Denmark and the SNCF in France is investing a great deal in improving accessibility to its train stations, which are in general the main interchanges. SNCF website provides the accessibility status of most of the train stations and also provides telephone number and electronic guides for disabled people.

One of the main factors of success in Switzerland is that the access to rail stations is rather good. This is due to the relatively small size of Swiss cities and the relatively high standard for public transport, walking and bicycle use in general.

2.5.2.4 Overview and description of main barriers

This section will describe the main barriers that some countries have to overcome in order to have successful interchanges.

The main barriers consist of poor planning and location of interchanges together with poor links between points of interchange. Many interchanges are relatively close and can be easily connected, however, infrastructure providing safe and secure transfer needs to be implemented. Poor connections with airports exist in Hungary, Greece and many countries feel that this important link can be improved. There are also many interchanges that were never modernised and are now dated with poor facilities, especially to the eastern side of Europe.

A good example is the Czech Republic, it does not have access to the standards or research required to build appropriate modern interchanges. The resources to do so are considered to be an even greater issue. Most terminals are out of date and do not conform to current vehicular and passenger requirements. There is a need to develop guidelines and standards within the Czech Republic that assist planners with the choice of location together with the design of modern accessible interchanges.

All Czech airports are served only by buses and taxis or in a better cases by shuttle-buses. Prague-Ruzyne airport is in addition to served by express low-floor buses of passenger transport line with a dedicated place for luggage. There are no interchanges designed or built so far based on principles specific to intermodality.

2.5.2.5 Short category conclusions and recommendations

Experience varies throughout Europe. The planning and location of interchanges is identified as one of the most important issues for success together with safe, secure and short transfers between points of interchange. Vice versa poor planning and location of interchanges with poor transfers is seen as a barrier to intermodality.

The following points summarise the conclusions of this section:

- As mentioned above, logistics – locating the interchange in the centre of a city, with access to all modes of transport is important;
- Interoperability - interoperability between modes needs to exist;
- Passenger friendliness – provide up-to-date travel information; provide safe and clean waiting facilities; ensure that the layout of the interchange is easy to understand for visitors;
- Security – users need to perceive that the interchange is a safe place to be, not just for them but also for their bicycles and other equipment;

- Financial – substantial investment is needed in order for the interchanges to reach high standards.

To summarise the recommendations of this section:

- A document is needed that provides guidance on the planning, locating and design of interchanges including the provision of transfer between interchanges.
- Outline a standard for travel information, safety, accessibility and other facilities at interchanges including the removal of language barriers.

2.5.3 Integration of transport services and timetables

2.5.3.1 State of the art

The integration of different transport services including integrated timetables - mainly with regard to the different public transport provisions-, is a basic requirement for a qualitative passenger intermodality. We asked national experts to have a look at the following issues in their country more in depth. Again, one of the questions was to assess the current overall status w.r.t. the integration of transport services and timetables on a four point scale (poor/rather poor/rather good/good) with the option not to answer the question.

Current status of development ...	(rather) good	(rather) poor	don't know
1. Time-table co-ordination, intermodal service waiting in case of delays (esp. air-rail) and capacity co-ordination (esp. high speed-train to urban networks)	11	11	5
2. Interchange ability of air / rail or coach trips	8	18	1
3. Integration of ferry and river transport	5	8	14
4. Integration of taxis with rail and inter-city bus travel	21	6	0
5. Integration of car-sharing / car pooling into long-distance intermodal travel	5	17	5
6. Integration of cross-border regional transport systems	8	15	4

From the table we can see that the situation with respect to service integration between taxi's and long distance rail and bus travel in the countries analysed is developed most wide spread (in 18 out of 24 countries the situation is considered rather good to good). More critical notes are found w.r.t. the

- interchange ability between air travel on the one hand and rail or coach trips on the other hand;
- integration of car-sharing and car pooling and long distance travel and
- integration of cross border regional transport systems.

W.r.t. these issues, a majority of the countries state that the current status is either poor or rather poor. The current status w.r.t. time table co-ordination, intermodal service waiting in case of delays and capacity co-ordination is by part of the national experts considered as poor to rather poor, by another part of the experts as rather good to good.

Except for the wide spread integration of taxis with long distance rail and bus travel, There is only a small number of leading countries who perform good on (almost) all the issues mentioned in the table. A country of best practice seems to be Switzerland, followed by some Scandinavian countries (Norway, Denmark and Sweden), Austria and Great Britain. At the end come the East European countries (with Poland and Bulgaria as best exceptions), Southern countries (Greece, Italy and Spain) and Belgium.

2.5.3.2 Selection and short description of good practices

There are many examples of good integration of transport services and timetables from many different countries. These examples cover everything from well integrated ferry services, timetables and car-sharing.

The examples of good practice are categorised under five sub-headings: timetable co-ordination, integration of ferry and river transport, taxi services, car sharing services and rail services.

Timetable Co-ordination

Switzerland has an internationally recognised system of timetable co-ordination known as Bahn 2000 (Rail 2000). The concepts include faster and more frequent, comfortable and direct services. The main cities are connected with half-hourly services, with this frequency increases to quarter hourly for very busy regional lines. The train speed is determined in the system by good connection in the interchange stations. The hub-and-spoke system operates by trains and buses arriving in the station shortly before the hour, quarter past, half past or quarter to and then departing from the station shortly after. Using this system, travel times get shorter. In addition all of the larger centres are connected by direct intercity trains. The base for the introduction for Bahn 2000 was a referendum in 1987, and through the financing of railway modernisation in 1998. Also certain measures were necessary to achieve the concept including rail construction projects, such as speeding up certain lines.

The timetables in Luxembourg are co-ordinated using a similar system, for example trains depart from Luxembourg ten to the hour leaving for Ettelbrück, and arrive in Luxembourg at ten past the hour from Ettelbrück. The means that hourly services of each operator have both onward and return journeys at the same time interval between trains, and thus remembering the train times becomes easier. The French SNCF does not use this system in Luxembourg.

In Japan there are few worries concerning intermodal waiting services, as delays are few and far between. There are also such a high frequency of services leaving the main centres in daytime hours that it is not necessary to adjust the train schedules. However, the timetables of the last train are often adjusted to allow for delays.

Within some federal states of Germany the timetables of regional passenger rail transport are well co-ordinated. These states apply the concept of ‘Integraler Takfahrplan’ (synchronised timetables) and include North Rhine-Westphalia, Rheinland-Pfalz and Bavaria.

In France high speed trains (TGV) and regional trains are well integrated, and regional trains will often wait for the arrival of a delayed TGV. In France SNCF runs both the national TGV and regional services, and so train drivers can drive both services.

Integration of ferry and river transport

In Greece and Norway the complicated geography of the country has created an environment where ferries are well integrated into the public transport network. The alternative to routes often involves lengthy inland detours. Consequently there are clear economical advantages to integrating ferries with road transport.

The ferry services between the Ireland and the United Kingdom contain good examples of well integrated services. The quality of the intermodality varies depending on the particular service in question, with certain routes catering solely for car users, but other routes operate integrated services with public transport users in mind with integrating train services and combined ferry/train tickets available. The ferries arriving at Hoek Van Holland from Harwich in Great Britain are met by trains every 30 minutes heading to Rotterdam Central.

In Italy, dedicated buses or trains link cities to sea terminals in order to access the Islands, and ferries cannot leave until the connecting train/bus has arrived, and at the destination the train/bus cannot leave until the connecting ferry has off-loaded all passengers. Frequencies of regional trains are often linked to departure/arrival times of the main line trains, these frequent regional trains ensure the possibility to catch the train for passengers not living in the city of departure.

In Japan there is also a well established multimodal transport system involving sea ferries allowing fast transit and smooth transfers for both passengers and freight transport with intensive enhancement of the connections between the ports and the highways (MLIT, 2003b, p. 219).

Taxi services

The major transport operator in the Netherlands, NS Group has organised 'Treintaxi' to fill the gap between stations and points of departure and arrival that can't be served by classic public transpot. Treintaxi is not a classic taxi and is often shared with strangers, the price is 4 Euros a person and is paid at a machine in the station. There is a marked pillar with a call button at the front of stations, after which the taxi should arrive in no more than ten minutes. This system is very popular and cheap, but following the increased cost NS had to make cuts to this service, and from April 2004 the number of stations served by Treintaxi dropped from 110 to 62.

The major travel company in Sweden, SJ, offer a similar service called 'TrainTaxi', where the traveller can order a door-to-door trip which books both train and taxi in one place. The departure and arrival times are printed on the ticket, and these can be bought from various operators including SJ. As TrainTaxi is nationwide, local taxi operators co-operate.

Car sharing services

Car sharing is well integrated into long-distance intermodal travel in Germany, as a branch of German Rail (DB), called DB Rent, is offering a service called DB Car sharing. In co-operation with other car-sharing companies DB Car sharing offer at all major and many medium size stations this service to passengers who own a BahnCard (yearly pass for public transit and other subscription forms). This service currently has around 48,000 users.

The availability of car sharing at railways stations in Switzerland is also in general very good. At 350 rail stations around 800 cars are provided by RailLink Car Sharing. Passengers can additionally use the service of DB Car sharing in Germany (see above). Frequent rail users who own a Halbtax-Abo or General-Abo (subscriptions to rail service) pay a charge and may use the service. RailLink CarSharing is also available for companies in the 'business version' of the service, offering lower fees and transferable RailLink-Access cards.

Rail services

The 'AutoVlak' is a traditional train service operating between Prague and Slovak Tatras, designed for travellers who wish to travel with their own cars. It operates between Prague and Proprad on a daily basis all year. The JADRAN express is similar to the Autovlak, and was introduced as an additional mode of transport to the Jadran Sea operating between Prague and Split once a week between May and September and has so far proved popular, particularly with tourists who do not wish to drive considerable distances (especially those with young children).

One of the best known intermodal transport concepts is that of AirRail in Germany. Lufthansa's AiRail-Service from Stuttgart and Cologne's (soon also Düsseldorf) main railway stations to Frankfurt Airport offers a service of baggage check-in and issuing of the boarding card, which takes place in special Lufthansa check-in and check-out facilities within the railway stations. The transport of the luggage takes place in the same train as the one that is used by the Lufthansa passengers and is already included in the combined AiRail ticket (Lufthansa and Deutsche Bahn). The substitution of domestic short range flights (that lose money) by rail, and the re-use of the scarce slots that were occupied by those flights at Frankfurt Airport for profitable long range flights, contributes to the financial feasibility of the service.

2.5.3.3 Overview and description of main factors of success

An important factor of success in Switzerland and other countries with relatively successful integration of transport services and timetables is the positive attitude of a large part of the population towards public transport and innovative transport concepts. The high quality of public transport and the public support that can be articulated via referendums (in the case of Switzerland) are a positive environment for the realisation of intermodal measures.

For new member states where there is less experience with integration of services, the factor of success is the ability to learn where others have failed and implement successful solutions within a committed and co-ordinated environment. Some countries such as Slovenia have no experience of implementing long-distance transport solutions and so international experience and concepts are critical. There is great scope for potential national economic growth, particularly within the tourism sectors, and therefore accompanying investment in transport and intermodality.

2.5.3.4 Overview and description of main barriers

Poor political will in some countries, such as Romania and Estonia, acts as a barrier against the successful implementation of a well integrated and intermodal transport network. This cannot be blamed solely on the government however, as in Slovenia for example there is little public support for improved transport services or pressure groups lobbying for improved bus/train/cycling facilities.

Adequate transport funding is one of the greatest barriers to achieving good intermodal and well integrated public transport services, particularly in countries such as Great Britain which has arguably experienced decades of under-funding in its public

transport network. Countries such as Bulgaria are also suffering from a chronic shortage of adequate funding in infrastructure. Lack of co-operation and competition between operators, as well as between operators and local authorities, can be viewed as a major barrier to improved integrated services and timetables, particularly in countries such as Germany and Great Britain. Greater co-operation and dialogue could improve services without necessarily removing competition.

A barrier in terms of culture is significant when considering transport initiatives such as car pooling and car sharing. The idea and principle of sharing ones car is not favourable to many people and even with established practices in place, there is no guarantee that people will choose to share their cars and remove the element of privacy.

Timetables in the Netherlands are well integrated, but this is mainly linked to the high-frequency of services. However, the reliability of the services is not good enough and many missed connections result in additional waiting. Consequently, good planning does not work if what is planned is poorly achieved.

2.5.3.5 Short category conclusions and recommendations

There are varying levels of integration of transport services and timetables throughout Europe. Good practices can be seen in a number of countries such as France, Denmark and Switzerland. Other countries exhibit good planning and intentions but poor time keeping disrupts actual integration. Many other countries have very little planning and integration or integration is made difficult by the competitive practices.

Greater co-operation and co-ordination between transport operators and providers is required, particularly in deregulated or less regulated environments, to facilitate the development of better integrated services. Although co-operation between competing companies seems difficult to achieve, it is a prerequisite to a fully integrated transport network. A co-ompetition (co-operation and competition) is possible in certain market environments if a win-win situation can be created (e.g. AiRail – see above) which would serve as an example for other fields. A regulatory and legal framework is needed to give incentives for co-operation. Concepts in this field are widely missing, so that research in this field would be important.

In countries such as Great Britain and Spain, it has been suggested that the establishment of forums are needed in order to appropriately consider and help facilitate longer distance internal trips, as opposed to local and regional trips that are presently considered by local transport authorities. More centralised countries such as France and Japan have developed fast and efficient national rail networks.

It is also important to note that the will of the country and the importance of public transport to its people is extremely important in terms of funding and implementing improvements to the integration of services.

Our recommendations are as follows:

- Greater control should be managed by local authorities with aim to co-ordinate private public transport services. Control can be managed through the issue of operating licences. Greater control should be managed in particular where public transport frequencies are not high.

- Develop National forums for the integration of long distance transport services and timetables. This would ensure co-ordination between cross boarder ser-

vices and operators in neighbouring countries. The forum would need to work closely with public authorities in relation to the point above.

- Commission documents on innovative ideas and working solutions such as “Treintaxi” and the integration of car sharing with public transport.

2.6 Information

2.6.1 Introduction

Integrated and real-time door-to-door information systems (both pre-trip and on-trip) are a key tool in developing workable and attractive long-distance European passenger intermodality. Technology is a major driver of progress in passenger information. Information is often available per mode and per network hierarchy level. Much progress on integrated information systems has been made at the regional/urban level; however, there is no equivalent intermodal structure that would promote integrated information at national or European level.

2.6.2 State of the art

The state of intermodal and integrated passenger information in Europe is quite heterogeneous. From the perspective of the European long-distance traveller it is still poor, especially if border-crossing elements are included in the travel chain. Real intermodal information, including various transport modes continues to be lacking.

Some countries however have already achieved a good integration of public transport information on a national (Netherlands, Denmark) and/or regional level. The forerunners of intermodal and integrated passenger information are mainly found in Western Europe. Germany, Switzerland, Denmark, the Netherlands and the UK for example have already achieved a highly developed information systems and continue to push innovations in this field. Door-to-door information by phone, mobile devices or over the internet are slowly becoming the standard, especially on the urban and regional level. A nationally integrated public transport information system has already been implemented in the Netherlands and in Denmark; acceptance among users is high. Other countries have the development of a national information system on the agenda (e.g. Switzerland, Germany, UK). A particularly good example can be found in the Czech Republic, especially compared to other Eastern European countries, legislation contributes to the creation of a national database and the quality of information. Japan also has a comparatively good standard in many fields of passenger information. However, there remain weak areas even in countries that put considerable effort on high quality passenger information systems. In particular, real time information and the integration of fare information for a travel chain that contains more than one mode or operator.

A large group of countries in Western Europe, Scandinavia, and a few Southern and Eastern European countries can be seen as the midfield contenders regarding the quality of passenger information systems.[8] Internet based services, printed informa-

[8] E.g. Ireland, Belgium, France, Luxembourg, Portugal, Hungary, Austria, Italy, Sweden, Finland, Sweden and Norway; in Eastern Europe: the Slovak Republic.

tion and phone services are available. More innovative areas that aim at the integration of all transport modes and the coverage of a whole transport chain are developing relatively slowly. Information sources on single modes are often good, but when looking for information that covers a travel chain, this becomes a desegregated service concerning many different operators and authorities frequently makes it difficult to gather the necessary information. In many countries the need to catch up with available technologies and services is recognised by the government. Although lagging behind the innovator group, many of these countries can offer interesting individual projects (realised or as pilot) in certain fields of passenger intermodality.

Those areas that are underdeveloped in terms of passenger information systems are parts of Southern and Eastern Europe[9], where information services are partially missing completely or extremely split up and innovative technologies still need time to be applied.

The table below provides a general overview of the current situation throughout the study area. The national experts were asked questions regarding the current situation in their country in terms of good/rather good/ rather poor/ poor. The table illustrates the distribution of responses.

National expert assessment of the current status of development of...	(rather) good	(rather) poor	don't .
1. Information about intercity terminals	6	18	3
2. Info accessibility/availability for non-car options	10	13	4
3. Integration of urban, regional, national information systems/– centres	13	13	1
4. Application of internet, mobile phone and PDA's	18	9	-
5. Languages and pictographics	10	13	4
6. Management and information on disruptions	6	18	3
7. Real time information pre- and on tripR	6	21	-
8. Impartial multi modal travel information	6	17	4
9. Door-to-door information services	6	18	3
10. Comparative total trip cost information	1	23	3
11. Consistency of information systems	11	12	4

The response in the table highlights a number of points on which we would like to elaborate further. Mobile solutions and the use of the internet for example have already been realised and are being further developed in many countries all over Europe. The wide implementation of such technologies is shown by the fact that this

[9] E.g. Spain, Greece, Poland, Bulgaria, Romania, Slovenia, Lithuania, Latvia, Estonia.

field received the highest response within the good or rather good category (18 from 27 countries[10]).

Weak areas, even in countries that put an effort on high quality passenger information systems, relate to real time information and the integration of fare information for a travel chain that contains more than one mode or operator. In general, not less than 6 issues are considered by the majority of the countries as poor or rather poor.

These issues are:

- Information within the urban transport systems about inter city terminals;
- Management and information on disruptions to long distance intermodal transport;
- Real time intermodal and multimodal information pre and on trips;
- Impartial multimodal travel information;
- Door-to-door information services, and
- Comparative total trip cost information.

For each of these issues, there is still a lot of work to do in Europe. At the same time, the analysis puts light on some good performing and leading countries with regard to these issues.

2.6.3 Selection and short description of good practices

To achieve a truly integrated real-time door-to-door information system is a challenging task. This is a key tool for promoting intermodal passenger transport. Technical and organisational questions that have to be solved are very diverse. However, there are in many countries good examples of how to approach this task. No country has realised the most innovative solutions in all fields, but experiences across Europe show feasible ways of approaching the field of passenger information.

European and border crossing information systems

Information about international rail transport is frequently available through the use of the various national rail information services; this does not enable the traveller to plan a complete seamless journey. Border crossing traveller information, which is multimodal and enables door-to-door travel planning is still the weakest point in intermodal and integrated passenger information. It seems that there is not much interest or lobby in the nation states to develop systems that would present a seamless European travel experience. However, there are a few good examples of initiatives that aim to solve the problem.

Perhaps the farthest developed truly European approach to passenger travel information is the EU-SPIRIT project. This was started with the aid of EU funding and is – after the end of funding – continued by the consortium partners. EU-SPIRIT is a European travel information system offering the calculation of itineraries (door to door travel information) between European cities and regions with regard to public transport, including all transport modes offered by certain operators in Sweden, Denmark and parts of Germany (long-distance as well as short

[10] The expert assessments of the status in Estonia and Malta are missing.

distance). EU-SPIRIT is not a travel planner itself, but a compilation of already existing internet-based information systems integrating existing systems through an open interface standard. It has ambitions to become a fully European system and is a promising approach to a truly European travel planning system. However, it hasn't yet migrated beyond its trial size of 3 countries after several years of existence. Furthermore it is not a truly intermodal information system as it focuses on public transport and walking information (cf. EU-Spirit Consortium 1998).

Another promising approach was realised – at least for the time when funding was available – in the TRANS BASEL project. TRANS BASEL is a trial door-to-door European intermodal cross-border information system, which included road transport, in the Basel region in Switzerland, France and Germany. It was a research project that had 600 users per day at its peak. The project found that at least 20 % of users changed behaviour based on the information provided. However, the full production cost of such complex information was high and consequently the full update of the system has not continued although the system is still online. There were also many difficulties of data integration due to non-standardised information and unavailable sources. Recently funding for the project was stopped. It has to be stressed that TRANS BASEL was an intermodal approach to passenger information, including not only public transport but also information regarding car use (cf. Trans Basel Consortium 2004).

In the Oresund region, border crossing co-operation takes place in many fields. In connection with the opening of the Oresund bridge (1 July 2000) there was a strong political interest in integrating the industries, the labour markets, the research landscape and the transport systems of the region. Among the many initiatives that were started, the integration of transport information was one field.

National information systems

At the national level, some countries already have realised or are planning to implement a door-to-door national information system for public transport, largely pushed by national governments. Truly intermodal information systems, which include all means of transport are still lacking on national level. However, for the public transport user, in some countries, it is quite easy to obtain the necessary information for a long-distance travel chain, as some examples show[11]:

Denmark provides perhaps the best example of a national traveller information system. The Danish travel information system which includes rail and urban public transport is very good. Information is easily accessible both at local, at regional and national level via the Internet using one URL for all information: "www.rejseplanen.dk". This travel information system gives door-to-door information, including the walking time to bus stops and/or stations. It is also possible to get international train information about Denmark, the southern part of Sweden and the northern part of Germany on this web side. The private long-distance buses however are not integrated in the information system. Additionally on the web pages "www.trafikinfo.dk" covering Denmark and "www.trafikken.dk" for the Copenhagen Area, information on delays and changes in the public transport and information about road network work and delays on the major roads and traffic intersection is available.

[11] It has to be stressed that the national level in some countries – of course - is smaller than in other countries – which makes the realisation of a national information system much easier.

In the Netherlands the Information centre OVR9292 gives all information about Dutch public transport, via one national phone number (users pay for this service) or through the internet. OVR was founded in 1992, in collaboration with the Dutch Ministry of Transport and all the Public Transport operators (NS, the Dutch associations of regional transport companies and urban transport companies). REISinformatiegroep, the new name of OVR offers personal integrated door-to-door passenger transport travel information mostly by telephone (0900-9292), Therefore it has a low accessibility threshold. The group also is working on new GSM based services such as real time information about delays in public transport.

In Germany, a lot of local and regional public transport connections (but not for all) are integrated into the door-to-door information system HAFAS used by German Rail through an agreement on data exchange. German Rail's transport information system is well accepted and used by many long-distance passengers, and therefore can be seen as the most important German passenger information systems for national long-distance public transport. A rather good integration of long distance and regional/urban travel information including walking and public transport is already achieved in this system. It also includes maps and enables a comparison of travel costs by different means of transportation (e.g. rail, car, bicycle), which is a feature that can rarely be found elsewhere in Europe. A comparison regarding environmental impacts of your journey by rail and car is also provided. The system works well but does not include fares for all elements of the travel chain as yet. The system used in Germany is a version of the HAFAS software which has been developed over years and has achieved quite a sophisticated status (cf. DB 2004, Fachportal Nahverkehr 2004a).

Also in Germany within the DELFI[12] research project (sponsored by the federal government, Ministry BMVBW; co-operation with German Rail and the Federal states) a plurality of existing information systems is linked through an open network to enable complete information for national travel chains. The technical realisation of this system is ready for implementation. Currently, the question of who bears the cost of such a system is still an obstacle for introducing a potentially nation wide information system. Another problem is that information about tariffs is not integrated as yet and can only be accessed through individual transport associations/operators. The system runs on a trial basis which aims to cover the whole of Germany still in 2004 (cf. Fachportal Nahverkehr 2004a; Winnsberg 2004).

In the Czech Republic, something to highlight in the European context, we see an example of national legislation that guarantees an integrated (static) national timetable database for regional public transport. The provision and high quality of this database is guaranteed by law and is managed by the private company CHAPS. Passengers benefit from this generally accessible database. DATIS (the data management arm of Czech Railways) maintains the hardware for the basic internet searcher – www.idos.cz. The free internet searcher holding the CIS (National Schedule Database CIS) offers intermodal timetable information on various modal combinations including the train (Czech, International), buses (regional, national: Czech and Slovak) and urban public transport in the 3 largest cities- Prague, Ostrava and Brno. For some connections in the 3 largest cities, walking time for connections is also provided. Otherwise it is possible to choose any of the above or other schedules individually (47 other cities and flight schedules) which then form the basis of the search engine. Real-time train positions can also be found out for a number of train connections. The fully self-financing system is a national public

[12] DELFI – Durchgängige Elektronische Fahrplaninformation

transport information system that is used by over 0.5 million customers per month by SMS and the internet.

In July 2000, the U.K. Government launched a programme named Transport Direct. As currently envisaged, Transport Direct[13] should involve provision of information and selection, reservation, booking and issuing of tickets (or other travel permits), which cover all aspects of a journey. Transport Direct will act as a portal, data source and co-ordinator, but no compulsory data provision is expected. The government's vision is to have a one-stop information point for all forms of travel information exploiting all new forms of technology such as internet, digital TV, mobile and WAP mobile telephones and other hand held devices, as well as high street kiosks and public libraries. For 2004 it was planned to provide real time train information, real time information on many local bus services, multimodal travel information in the Internet, booking of long distance multimodal journeys on the internet, and the development of internet-based maps. It is expected, however, that it will take seven to ten years to implement all aspects of the initiative.

Currently there are already websites in the UK which provide detailed travel information for certain regions and modes, including also maps, but a truly integrated national portal is not available yet. However, it is possible to telephone a number of travel services, including Traveline, a national telephone service and web based application giving route and timetable information for public transport, which already covers many public transport long-distance journeys in the UK. This service integrates bus and rail services across the UK and almost covers door-to-door travel (only a selection of street names are contained in the database). The main web page highlights various regions of the UK. The user then selects a particular region and is directed to the appropriate on-line service for that region. The options available therefore vary between region.

France does not have an integrated national transport information system as yet. The lack of a national information system is recognised and there are initiatives to develop such a system. A relatively simple solution to enable long-distance passengers in public transport to get information about regional or local public transport services in certain regions is a webpage that contains links to local information services. Through PREDIM (plate-forme de recherche et d'expérimentation pour le développement de l'information multimodale) and thanks to InfoTransport association (www.infotransports.fr.st), a prototype of multimodale information, by Internet, is been created. It is called PASSIM (http://passim.predim.org) and it references all the urban, inter-urban, regional transport networks by name of city and the territory.

In Switzerland the integration of regional/urban systems and national public transport systems is developing and there are many best practice examples where modern information systems are applied. The website of the Zurich Transport Association (Züricher Verkehrsverbund) for example offers address sharp routing within the Kanton of Zurich, but also integrates all Swiss railway stations, which enables you to plan national trips from your home within the Kanton of Zurich to at least a train station somewhere in Switzerland (cf. ZVV 2004). Vice versa, Swiss federal railway offers address sharp information for Switzerland, including walking and urban public transport, using the HAFAS system (not the newest version like German Rail which has even more functions). Fare information between national rail and local public transport however is not integrated as yet (cf. SBB 2004a). The federal government is currently promoting the development of a nation-wide traveller information system, under the name MobilNet in form of a service for combined mobility, including

[13] Documented in TRANS-ITS project, State of the Art Report, 2001.

the so-called Langsamverkehr (non motorized traffic) and tourist information.

Regional and urban information systems

Certain features that can be seen as innovative on the national level, within many of the forerunner countries, are already standard on the regional or urban level. Door-to-door public transport information systems are quite common for regional and local public transport e.g. in the Netherlands, Germany, France, the UK, Switzerland, Belgium or Denmark. Walking information is included in many of such systems, often connected to maps and/or tourist information. Not all of the many positive examples can be mentioned at this point, however, it is worth mentioning two initiatives that cover a larger regional area.

Within several German federal states (which in many cases have a size and number of inhabitants comparable to smaller European countries), initiatives are realised or on the way to provide a comprehensive travel information service for public transport within the area of the federal state. In North Rhine-Westphalia for example the "Smart number for bus and rail" ("Die schlaue Nummer für Bus und Bahn") provides all public transport information by phone for the federal state (cf. Fachportal Nahverkehr 2004a). Within Belgium the operator De lijn have a door to door trip planner on their web site, this includs all links by foot, bus, tram, subway and train, also those from other operators, useful for all trips in Flanders, Brussels and some border towns in France, Wallonia and Netherlands. However, not all information from foreign schemes and stops are always available. The concept, in its next phase can be connected or integrated into other regional or national trip planners.

Besides door-to-door public transport information that integrates information on public transport services and walking information, are truly intermodal journey planners or information platforms, these innovative services are only slowly being implemented on a regional or local level. The few cases that already exist have to be highlighted in the European context, as they show the direction to what is possible, at least at a local level. What has to be evaluated in how far such systems can be applied on a larger spatial scale.

One of the sparse examples is the Traffic Management Centre VMZ (Verkehrsmanagementzentrale) Berlin, Germany, which offers a free internet and PDA accessible platform with a real time transport data system, including automobile traffic as well as public transport. Information regarding current disruption is accessible. The centre also provides a variety of other information services by mode but also in the form of an intermodal route planner, which is calculates combination options along a route by public transport, bicycle, walking, or car use (cf. VMZ Berlin 2004).

Another example which is still under development is the intermodal travel information platform of VOR, in the Vienna region in Austria. It has been developed under the EU-project ISCOM and offers door-to-door travel information including walking, cycling, taxi and car (Bruntsch et al. 2004). The system has been in operation since November 2003 (Internet and WAP). In its first months approx. 45.000 inquiries were counted during a working day. In a survey during the test phase 19 % stated that following the new system, they used a different mode than before, 35 % of individuals stated that they were now using a different route. Within the new project Vienna-SPIRIT (in the programme "Intelligent Infrastructure"), this public transport database will be integrated with routing information of private vehicles in order to achieve a truely intermodal system. Through mobile devices and integration into routing systems, on-trip assistance should be improved.

Special features: Real time information, mobile solutions and services for people with special needs

Apart from static door-to-door information, advanced services like real time information, mobile on-trip information will become increasingly important for the long-distance traveller. Especially in case of disruptions it is necessary to give recommendations on alternatives to enable the passenger to continue his journey as seamlessly as possible. The areas of real time information and mobile on-trip information, however, are quite a new development that can be considered as a real innovation. Due to rapid technological development a diverse range of such applications has been introduced in many countries as some examples from the national inventories show.

In Switzerland mobile solutions are developing and already available for certain public transport services, e.g. information via SMS. Swiss Federal Railways (SBB) for example offers a whole range of mobile solutions: real time information by SMS, SMS time table and WAP time table (cf. SBB 2004b). Real time information is also important when disruptions are evident and such information is available for many fields of public transport. Swiss Federal Railways has on its web page real time information about rail traffic which is also available by mobile phone. When a disruption is apparent or a connection is in danger, you will receive information on alternatives services (cf. SBB 2004a).

In the Czech Republic the bus and train schedule information (wap.idos.cz) and real-time train positions (wap.idos.cz/wap/poloha.asp) are available on mobile phone services and PDAs. Mobile phone operators providing bus and train schedule and other information are using SMS GSM services. The company Eurotel in addition provides a full door-to-door navigation service using its own SW (digital map) and data from CHAPS. By typing a geographic point the SW navigates the user from start to end location step by step including the walk link.

Today in France, information about disruption on inter-city transportation is quite good with a service called ‘infoligne’ available by phone or by Internet. Urban public transport networks are providing more and more similar services.

In Germany the importance of real time information has been realised. German rail already provides real time information on departure times and delays in major train stations. This information is displayed on screens at stations and can also be accessed via the web page of German Rail (www.bahn.de). However, a complete real time information system for all trains en route has yet to be realised. German Rail is working on the problem and has been slowly implementing the Traveller Information System – RIS (ReisendenInformationsSystem) since 2003 with aim to have it finally in place in the year 2008. It is planned that real time information will be made available for staff and travellers for inter-city trains and local/ regional trains. The service will contribute to better information on delays and train connections in stations and on the internet. German Rail plans to offer such data at a cost to other transport operators that are intermodally connected to rail if demand is given (development of an extra interface would be necessary), (Deutsche Bahn 2004c). For most of the rail bound regional and local transport the real time information situation is quite good as many public transport stops/stations already provide real time information. For buses such systems are more difficult to realise and only a few bus stops are equipped with such systems (cf. Fachportal NRW 2004b).

An ambitious project is the German research project COX[14] ("Communication and Orientation eXpert") which is based on the current technological feasibility and aims to integrating so called ad-hoc-information. Intermodality is promoted by providing the user with qualitative and quantitative information and route/ mode proposals. The project aims to deliver integrated information on an individual basis and position giving ad-hoc-information at any time, at any place. For the realisation of such a service key location and navigation technology on an individual basis is required with interconnections to communication network systems such as GPRS, UMTS, WLAN and Bluethooth. As a first step, the concept is to provide the user with pre-trip information about a route which can be saved on a mobile phone etc. As a second step, the user would be permanently guided by an intermodal on-trip information service automatically leading to alternative routes in cases of disruptions like delays. As a third step the user would be able to contact the intermodal service during their trip and to ask for information preceding their trip. Thereby the system would be integrating the global position of the individual and their required intermodal transport information. A change in travel behaviour towards public transport modes is being seen as achievable by using this technology (cf. ZIV - Zentrum für integrierte Verkehrssysteme GmbH 2004).

In Japan mobile solutions seem to be quite advanced and are well applied. An example worth mentioning is an intermodal door-to-door information service using a navigation system applying GPS called "EZ Navi Walk" produced by a mobile phone company, "au (KDDI)". This service for a mobile handset enables positioning and navigation of a person on a real time basis. It gives a map of the current position on a display and enables navigation to the desired destination; at train stations it would provide travel information on train schedules; on the road it would provide traffic information on road conditions. This system seems quite advanced and includes the important element of walking, which in many information systems is not considered sufficiently (cf. KDDI 2004).

The fast technological development of passenger information systems presents the danger that the needs of mobility and visually impaired people are not addressed adequately. Special needs are already addressed in a few countries by certain services that aim at such groups. In Ireland for example, there is information on the website of Irish Rail for mobility and visually impaired travellers.

In the Czech Republic we can see a good example of applications for people with restricted mobility (promoted by MOBILIS), where a local developer has developed a communication system between the visually impaired and in-coming buses at stations. In some larger cities most vehicles are equipped with communication equipment for the visually impaired. The visually impaired person has a device, which can remotely request acoustic information for orientation with respect to the stop, for a message from an arriving bus, which then relays the information on route number and destination (and any other relevant information) to a speaker on the vehicle. The visually impaired person may then announce his intention to board the bus through this device and the driver is duly informed through his own on-board receiver. This simple product has proved highly successful at improving the mobility and independence of the visually impaired in the Czech Republic. The system has been designed as a national standard and will eventually be extended to airports, junctions, shopping centres etc.

[14] Also see source summary COX - "Communication and Orientation eXpert" in the Annex.

As already mentioned in Vienna Austria the local passenger information system provides information on barrier free travelling for mobility impaired people. A specific advantage compared to similar systems is the detailed information about transfers at interchanges with regard to the availability of stairs, escalators or elevators; thus a barrier-free routing (exclusion of stairs) is possible.

2.6.4 Overview and description of main factors of success

When looking at the national inventories it becomes clear that certain factors of success contribute in the forerunner countries to the development of high-quality passenger information systems.

The available technology is already quite advanced and enables highly integrated information systems. The technical feasibility of such systems has been proven in many places, as the aforementioned examples show. The biggest problem for the realisation of integrated information is not on the technical side but on the organisational. If we take a closer look, it becomes clear that successful initiatives have been realised in places where somebody took the lead to push them.

There has been little interest in improving boarder crossing information from the nation states. The few projects that have been realised – have been pushed with the aid of EU funding, making the European Union the key player in promoting this field, although it seems difficult to keep such initiatives alive when funding comes to an end.

In some countries with a well developed national passenger information system the national governments, often in co-operation with national rail companies, have taken the lead to push such systems. The taken measures range from the Czech initiative that is based on a legal obligation to provide data to approaches of voluntary co-operation. However, it seems to be a success factor, that a strong institution takes the lead and brings together all relevant key players. In certain fields the integration of information systems is also market driven, once the start has been made, as public transport operators realise the marketing opportunity for their products and services on an integrated platform. A certain culture and will for co-operation has to be initially provided to bridge problems of financing and data sharing.

The demand for information by the users is certainly a success factor. Countries with a strong public transport market often have a strong use of new integrated information systems which contribute to the success.

Another success factors is research in the field of passenger information systems which creates products that can be brought to the market or even be exported alike the German HAFAS system (used by German Rail, Swiss Federal Railways and other operators).

2.6.5 Overview and description of main barriers

A main barrier for intermodal passenger transport on European long-distance journeys is clearly the lack of border-crossing information. An example of poor cross-border public transport integration can be seen by the fact that it is not possible to access information on connecting trains from, for example, Dublin to Cork from Northern Ireland Railways (or vice versa). It is only possible to access cross-border travel information to Dublin or Belfast. In this case, an individual in Northern Ireland would need to make an ‘international’ telephone call to the Republic of Ireland to

obtain the connecting train times from Dublin to Cork. Projects like TRANS BASEL and EU-Spirit show that border-crossing services are possible. However, there seems to lack a real interest on the national level to push such systems, and good examples are rare. As the case of TRANS BASEL showed, funding is a key issue for border crossing initiatives. Support from the European Union is often the key for establishing such projects. In Ireland by the way the Streetwise (Seamless Travel Environment for Efficient Travel in the Western Isles of Europe) Euro-regional project is currently conducting research into the provision of seamless and efficient travel information on the Ten-T between the Republic of Ireland and the United Kingdom.

The topic of languages should also be mentioned. There is much passenger information on the internet available in languages other than the national language, especially in English. However, this is not the standard yet, which makes it difficult for people who do not know the language(s) of a country to access the necessary information. Partially very heterogeneous signage in public transport ads another barrier for the international traveller.

The wide range of aforementioned good practice examples on a national level should not hide the fact that in general the state of passenger information systems in most of the European nation states is still unsatisfactory when aiming at providing user friendly information for a seamless long-distance travel chain.

A major barrier for high-quality passenger information services is in many countries is the lack of co-operation in a fragmented public transport market, which makes it impossible for the user to obtain the necessary information out of one hand. An example is the situation in Austria[15] where a recent analysis of the state-of-the-art in telematics found 40 different traveller information systems. The high number of systems complicates the exchange of information. There are few activities which are integrating different operators and/or different modes. Furthermore, compared to the defined user needs (EU-projects KAREN/FRAME), these information systems currently fulfil only less than half of the requirements (cf. Düh and Müllner 2003). The traveller information in Upper Austria presents a specific case for unfavourable user conditions: here the customer has to choose from two available databases each one covering many different (private) operators.

The unwillingness of sharing data may be one reason for a lack of co-operation, questions of funding and cost sharing another. The opening of public transport markets to competition was mentioned as an obstacle working against better co-ordination, this makes the market more heterogeneous and competitive.

Even in forerunner countries where many innovative passenger information services are already provided, passengers face barriers when trying to obtain user friendly information. Real intermodal journey planners are only available in a few cases on the regional/local level. Some countries may provide good basic national door-to-door information for public transport but there are still information gaps to be filled. For example, total trip costs taking into account fares from different operators, are generally not available under national travel information systems. For the user the information about the total trip cost may be key to the decision of starting an intermodal journey. Comparative trip costs between public transport, the car and by aeroplane are also widely lacking. The goal to give complete intermodal information with a trip cost comparison is still unresolved.

[15] which is just a randomly picked example as the situation in many other countries is similar or worse.

Real time information services, which are important especially for the management of disruptions, are being developing in many countries but so far they do not include all elements of an integrated long-distance journey. Many passengers fear the uncertainty of being unable to continue a journey that includes rail travelling when disruptions occur. Information on disruptions and alternatives need to be seen as a highly important element of information systems; this information is lacking. Although the problem has been realised in some countries and as the first services become available there is still a long way to go.

Internet based services and mobile solutions are developing quickly in many countries and are in some places already well accepted. Information systems in forerunner countries provide a wide range of functions and services. However, many such services are not available to all groups of society, some find such technology difficult to handle. Elderly people for example should be kept in mind as an important user group; they are often overwhelmed by the use of modern IT technology. The dismantlement of personal services at service counters, especially at medium and small size public transport stations has to be seen as a barrier for such people that are not willing or able to use modern technologies. The provision of information services by phone is fortunately widespread in many countries and should be seen as an alternative for such groups although they cannot substitute personal information counters completely.

Regarding those who are mobility impaired or visually impaired, some good examples of information services that do not exclude such groups have been mentioned above. However, most information services that are accessible by internet or mobile devices present a barrier to the visually impaired as they can not use them. In terms of the mobility impaired, information about barrier free access to stations, trains and buses are not included, although e.g. a single stair can already be a decisive obstacle for a wheelchair user.

In many parts of Southern and Eastern Europe many of the above described innovative technologies that are applied to improve the information services are lacking completely. A major barrier in such countries is that the technological infrastructure is not on offer or has not been developed to a standard which offers door-to-door journey planning and integration between different transport operators.

Many countries lag behind the technological development by several years, may it be because of a lack of interest or a lack of funding. However, countries like the Czech Republic show that self financing and innovative services are possible if the political will is given.

2.6.6 Short category conclusions and recommendations

As previously mentioned, today's technology allows the provision of a high-quality passenger information system. A group of forerunner countries proves that organisational issues can be solved and such systems can be implemented. However, it also becomes clear that within Europe, the state of passenger information systems is very heterogeneous and in large part still unsatisfactory. The intermodal long distance traveller still faces many problems when trying to obtain integrated total-cost information for his trip or information regarding disruptions.

The strategy of the UK Government is to provide a one-stop-approach that not only includes passenger information but also ticketing. This approach would seem to present an appropriate user oriented service.

Co-operation of authorities and operators, border-crossing issues and financial support are key areas where action is needed.

The question of how to finance high quality passenger information systems should receive greater attention. Standard methods of cost-benefit assessment are still widely lacking but are key to establishing such systems. The question of public funding and how to share costs amongst operators are equally important; there seems to be a low level of willingness from users to pay for such information systems.

In many problem fields it is possible to learn from examples of good practice. Some institutions have taken the lead and brought key players together and as a result they have achieved high-quality information services.

Much work remains to be done to achieve an intermodal, door-to-door, total-cost information system on a national or even European level, but many innovative ideas have been successfully realised in certain places and are possible elsewhere.

2.7 Ticketing/fares, booking/payment

2.7.1 Introduction

The feasibility of integrated ticketing becomes a major problem as a result of the many transport environments and differences between these environments. Air carriers, national railways, regional and urban public transport operators all have different fare policies and models (e.g. time, zonal and distance related), together with different subsidy models. This makes universal tickets a difficult proposition without overcomplicating them.

Another barrier to integrated ticketing systems is the fair division of income in integrated systems as it is difficult to practically monitor the complete movements of passengers within integrated systems on integrated transport. Where this is impossible, it is necessary to estimate which partner should receive what proportion of income from common tickets, this is often hindered by difficult negotiations between various stakeholders.

2.7.2 State of the art

The state of ticketing and tariff integration and the quality of booking and payment systems is very heterogeneous within Europe. From the perspective of the intermodal long-distance traveller, especially when border crossing connections are involved, it still has to be seen as poor, as for many journeys it is necessary to obtain tickets from different places. Truly intermodal tariff and ticketing systems are widely missing, although there are a few good examples of such initiatives, especially in the air-rail sector or in the ferry-rail combination.

Some countries have already achieved a good national or regional integration of ticketing and tariffs in public transport. The Netherlands and Denmark can be seen as forerunner countries where a high level of tariff and ticketing integration in public transport could already be realised. In the case of the Netherlands, this system will be based on a smart card system in the near future.

Other countries like Italy, Austria, Germany, Belgium or Switzerland already provide a comparatively good integration of regional public transport tariffs and ticketing. This enables the public transport user to travel without too much ticketing hassle in relatively large areas.

Many Eastern and Southern European Countries are still lagging behind such larger scale integration. However it can be observed that the topic is seen as important in many of those countries. It is particularly the case in capital regions and other larger agglomerations where many initiatives evolve to integrate fragmented and user-unfriendly tariff and ticketing systems.

Electronic ticketing is a topic all over Europe. Forerunner countries are generally seen as Western Europe or Scandinavian countries, but many Southern and Eastern European countries show interesting individual initiatives especially at urban and regional levels. However, most smart card systems function over a relatively small area, they have few functions, and they don't always operate between all modes. They are therefore still not able to cover the needs of the intermodal long-distance traveller.

Booking and payment systems offer more and more options such as making reservations or paying for a journey by phone or through the internet; this also applies to long-distance traveller. Smart card systems and mobile devices offer even more convenient payment systems on the regional level and may be feasible for introduction at a national level in some countries, although necessary investments in such systems may be considerably high.

Lots of research is done especially in some Western European forerunner countries, aiming at optimising the use of modern information technologies for ticketing, booking and payment systems. Highly developed technologies are already available. However, the national inventories show that the most important obstacles for the realisation of highly integrated ticketing and tariff systems are rather organisational than technical questions.

2.7.3 Selection and short description of good practices

Regarding the topics of ticketing, fares, booking and payment, it becomes clear that an intermodal European integration of such systems is still a utopian vision. This does not mean that technologies to achieve such a goal would not be available, but practice all over Europe shows that particularly organisational questions pose an obstacle to such a development. Especially real intermodal solutions are lacking. However, many good practice examples show that good and easy ticketing and booking for intermodal travel chains or at least within the public transport system is possible, and indicate necessary steps to achieve ticketing and tariff systems that contribute to a user friendly seamless travel chain.

Special attention when aiming for European integration has to be paid to cross-border solutions. There have been a few good examples, e.g. in the Lake Constance area of Germany – Switzerland - Austria, between Belgium and the Netherlands, and others (cf. to CONPASS). However, these examples are rare and the integration of tariffs and ticketing remain limited in most cases.

A example of good practice in this challenging field is the In the Öresund region of Denmark and Sweden. An intermodal ticketing system covers Danish and Swedish trains running through the Copenhagen and Skåne areas. The tickets do not only cover trains but also busses in the two regions and the ferries between Denmark

and Sweden. The ticket is issued from one train station (in one of the countries) to another train station in the other country, and covers travel with busses or metro on the same ticket zones. If you are travelling further than these zones or to other regions, it is possible to buy a supplementary ticket to a reduced price. This means that the ticket co-operation between these regions in Denmark and Sweden is very similar to the ticket co-operation within Denmark itself. It is the railway companies and the local bus authorities that are responsible for the ticket co-operation.

Regarding the integration of ticketing systems and fares, it becomes clear that most good examples can be found on the regional or local level. However there are examples of national integration schemes that can also be highlighted, these provide a European context.

The Netherlands is probably the best example in the context of national fare and ticketing integration. The Dutch STRIPPENKAART (consisting of "strips") which was introduced in 1980, is valid throughout the country for buses, trams and subways. It is also valid on trains which travel within the city boundaries of Amsterdam, Rotterdam, Utrecht and The Hague/Zoetermeer. The country is divided into transportation zones with set tariffs. Travelling through the zones has to be paid with a certain amount of "strips" from the ticket. The advantage is a clear understanding of costs to the user and the interoperability between all tram and bus operators. A problem is that this unique instrument does not admit any price differentiation, and for the adherents of the deregulation it is an obstacle to tariff freedom. Currently, the four major public transport companies in the Netherlands are working on a pilot scheme that would introduce a common smart card system. The aim is to establish a seamless ticketing system which allows the use of all public transport modes nation-wide (VOYAGER 2002a). The strippenkaart will gradually be substituted by a Philips MIFARE contactless smart card system in next few years, which offers many benefits for operators and users.[16] However, the introduction of the system is estimated to cost 1 billion €.

In Denmark a good integration of long-distance rail travelling with local public transport has been achieved, as it is possible to use local buses when you buy long-distance train tickets. However, on a few areas on Fyn, it is not possible to combine train and bus tickets as yet. The initiative makes it cheaper to buy combined tickets instead of single tickets.

In Switzerland frequent users of rail and public transport do not have to worry about fares and ticketing, when they buy the so-called "Generalabonnement", a subscription which entitles you to use nearly all rail, public transport, ship etc. in Switzerland. This enables the passenger to travel throughout the country without ticketing and tariff hassle, but makes sense only for frequent travellers due to the price (2900 Swiss Franks a year).

National examples of fare integration are few, but at regional and local levels fare and ticketing integration can be found in many places. However, what seems to be

[16] Main arguments in favour of the system are e.g. the interoperability on all Dutch passenger transport services, the possibility to vary tariffs (e.g. for peak load pricing) the lowering of thresholds to use all passenger transport systems, the possibility to enlarge usability to other related products or adjacent services, the possibility to close platforms or vehicles for fare dodgers, improved social security, less on-board payment procedures (what results in shorter halts on stops), the possibility to gather information about line operation (via GPS), vehicle occupation, passenger flows, and the collection of exact data for dividing traffic revenues between operators.

standard in some countries like Austria, Germany or Italy is still rare in some other countries, especially in Southern and Eastern Europe. A few good examples will be mentioned at this point, however, it is not possible to mention all examples of good practice regarding ticketing and fare integration on a regional and local level.

In Scotland, an example of a larger scale integration, the Journey Solutions Partnership, which is run by all major bus and rail companies, has developed the PLUSBUS initiative, with support from the Scottish Executive. The scheme enables people to buy rail tickets that also allow all day bus travel within the relevant local PLUSBUS zone. The initiative is a good example of through ticketing. The zones cover most parts of mainland Scotland. Tickets can be bought for both the start and end legs of journeys from all participating rail stations. PLUSBUS tickets are also available throughout Wales and also in England, although there are areas within England where it is not possible to get a PLUSBUS ticket e.g. Liverpool and Leeds. Interesting is how the difficult point of revenue sharing is solved. The cost of PLUSBUS tickets are set at a certain level, agreed by all bus operators. Upon purchase of the ticket at a train station (ATOC set up the ticketing process), the details of what ticket has been purchased are entered into a national database located at York Station. Once every four weeks, this database then distributes the revenue to the relevant bus operators (or occasionally passenger transport executives, PTEs). This system is called the Rail Settlement Process. Despite these positive examples it has to be stressed that the UK provides in many cases unfavourable conditions for co-operation in ticketing through the implementation of competition laws (see barriers section).

Belgium is another interesting case of regional ticketing and fare integration, as the country's three regions (Flanders, Wallonia, Brussels) have central operators that guarantee homogeneous tariff structures and the way in which the transport market is liberalised prevents fragmented structures.

On local and regional level in Italy integrated ticketing and fare systems are well established. A common feature in many experiences is the choice of a ticketing structure based on "zones" and related subzones: to each sub-zone corresponds a single fare. A single ticket (subscriptions, season tickets, one-way or day tickets, etc.) is required to travel across the areas. This scheme is usually called in Italy "Sistema Tariffario Integrato - STI" (Integrated Fare System). It is valid in general for regional trains plus inter-urban and urban buses. Formally, STIs are contracts involving public transport operators who besides allowing passengers to use a single "ticket" for travel are also requested to provide appropriate facilities and infrastructure (parking, bus stops, terminals, etc.) and to co-ordinate the public transportation modes so that passengers feeling that they are travelling just by a single mode (Piacenza and Carpani 2003, p.11). STIs networks differ from region to region, in terms of involved areas and modes; geographically speaking, STIs can be valid from municipal areas (as in Genoa or Naples) up to whole regional area (as *Trenomarchebus*, in Ancona). Different concepts have evolved that successfully solve the difficult problem of revenue sharing among the various operators.[17]

[17] a) according to the transportation supply of each operator (defined according to different parameters, from case to case, for instance: in vehicle-km or seat-km), as in the STIs of the Trento province, along the Tarvisio - Udine line, in Tuscany, in the Roman area and in Sicily

b) according to the number of travelled people (in passengers - km), as in a good amount of STIs

c) according to a so-called "agreed" criterion, i.e. percentages of each operator are calculated by former data on income; as the b) system, also this procedure is very common. In some cases, a mix of b and c procedures is also used.

In Germany and Austria's Regional Transport Associations (Verkehrsverbünde), there are well-established systems that provide similar level of fare integration to the Italian system.

An important development to be considered in the context of integrated ticketing and fares is the introduction of electronic ticketing systems like smart cards. Such systems not only make travelling in a travel chain more convenient for the user but also make it easier to obtain necessary data for the task of revenue sharing, which is a critical point in co-operation between different transport operators.

Such e-ticketing systems can already be found in many parts of Europe, often still on a pilot scale. In the already mentioned case of the Netherlands a smart card system will be introduced over the next years at the national level. Most activities in the field of electronic ticketing can be observed in Western European countries, but also Southern and Eastern European countries are making efforts to implement such systems in certain places on a local level (mostly capitals or other important agglomerations). A common smart card system at a European level is still far away, but the implementation of such systems, especially on the regional and local level, have already advanced as some examples have highlighted.

A very ambitious project of integrated, multimodal ticketing with a contact-less smart card has been developed in Switzerland under the project title "EasyRider" (Basel, Genf). The idea was to give passengers the option to pay automatically (via smart cards) while getting on and off the public transport vehicle of any regional public transport or national railway operator. Participating partners were SBB, Schweizerische Post, Verband öffentlicher Verkehr and Bundesamt für Verkehr. The testing of the system was successful, but it will not be implemented throughout Switzerland as considerable investment is required by public transport operators. The EasyTicket that was tested within EasyRider is a simpler chip card that saves information about a certain ticket that has been bought by the user. The plan is top implement this system following ongoing work on a common Swiss standard (cf. Fachportal Nahverkehr 2004).

In Portugal an interesting example of electronic ticketing can be found in the Metropolitan Area of Porto. This was implemented following the construction of a light above-ground Metro system. The tariff system in force was reviewed and a new system adopted. The cost of the trip now depends on the start-point and destination, thus the tariff system is now independent of the operator used or the number of interchanges made by the passengers. In terms of ticketing, all the operators agreed to adopt a non contact smart card system (transport ticket for the metropolitan area of Porto called "ANDANTE"), this pioneering system in the using this technology will allow the development of a joint database, which would provide better knowledge of mobility patterns and improvements in the key issue for revenue sharing.

One of the few examples of smart card use in long-distance travelling can be found in Finland. A common electronic ticketing system is in place for all long-distance bus operations and it is widely used (about 500,000 cards in use). The future goal is the integration of this system with the rest of the public transport system.

Japan, the comparative case to Europe, provides good examples of large scale smart card use. There are already several systems in use. The "Suica" (Super Urban Intelligent Card) system for example is a contact less smart card that includes a

commuter pass (at the moment limited to this kind of ticket) and pre-payment functions. It is available within the Tokyo Metropolitan area and the Sendai area. The system was introduced by the large private rail company JR East. Other private public transport operators are working on smart card systems compatible to the one used by JR East. What makes the case interesting is the high number of users. 6,500,000 cards have been distributed that can be used at gates at 424 train stations.

In Austria the implementation of smart cards (electronic ticketing) for public transport has not reached a visible level yet. However, Austria is a good example of a country that realises the importance of the ticketing issue and is attempting to catch up. In 1999, the first study funded by the national transport ministry analysed the status and the user needs/acceptance. Here especially the use of smart cards for intermodal solutions has been considered. The study showed that most work so far dealt with technology issues instead of organisational issues that have often been encountered as serious barriers in pilot projects (BMVIT 2003b, p.16). In the current research programme "Intelligent Infrastructure" the national transport ministry will fund a new project TRANSMOBIL 1 that will develop the basis for a nation-wide interoperable system for electronic ticketing in technical, legal and organisational respect (BMVIT 2004, p.34). With regard to mobile ticketing (selling tickets via mobile phone), Austrian Rail (ÖBB) is one of the forerunners from an international perspective. Since 1999 customers can buy tickets via SMS (and now also WAP). The ticket will come as an SMS and will be paid with the phone bill (cf. Anon 2002, ÖBB 2004). This solution is customer friendly but does only cover the rail part of the journey. So far this approach is not intermodal but the mobile ticketing solution could also be feasible for intermodal journeys.

In the context of smart card systems standardisation activities are highly important to push the introduction of such systems on a national and European scale. In Germany the Verband Deutscher Verkehrsunternehmen (VDV, Association of German Transport Undertakings) developed, in co-operation with the Federal Research Ministry (BMBF), the so-called VDV-Kernapplikation (“the core”), which offers the standard and organisational frame for a nation-wide interoperable Electronic Fare Management (EFM) system. An important ongoing step regarding the Kernapplikation has been the development of a steering committee, the last specification have been agreed which now enables the system to be specified in public transport tenders. A large number of local/ regional transport operators already signed a letter of intent to use the VDV Kernapplikation and Deutsche Bahn AG (German Rail) – regional transport branch - shows high interest in the concept as well. Thereby the introduction of a national interoperable system seems to be within reach. However, the cost of new systems for EFM is considerably high. Within one Verkehrsverbund (regional public transport associations), there may occur costs within the hundreds of million Euro range. For Germany as a whole this would mean costs within the range of billions of Euro. In times of tight financial resources this may be the main obstacle for the introduction of such systems. This is also a main critique point towards the VDV Kernapplikation from experts like Andreas Knie, who deals with innovative intermodal products like DB Car Sharing and Call a Bike, and favours the normal cell phone for these services[18], using e.g. a call to a certain number to check in and another number to check out. He sees the smart card concept as a product of the nineties and the cell phone as a more adequate product for the twenty-first century.

[18] ...without further components that would have to be integrated into the cell phone, just using the existing functions of the mobile phone.

Many good practices regarding the public transport sector can be found across Europe. However, as already mentioned a real intermodal integration of different modes outside the public transport system is still very rare in ticketing and fare systems. However, within the context of this study a few examples existent that should be highlighted as they show that intermodal integration is possible.

Especially in the air rail sector, real intermodal ticketing can be found. A good example from Germany is the codesharing between airlines and German Rail like Lufthansa's AiRail service (see issue 9 "Integrated services/ products) or the TAP Air Portugal and American Airlines codesharing for a few connections. Another kind of ticketing service is the one of Fly&Rail, which includes the rail and air fare for the journey integrated in your airline ticketbook. Fly&Rail is not a codesharing but an integrated ticketing that is a quite successful. A long list of airlines and travel agents are co-operating with German Rail to offer this integrated kind of ticketing for rail and air (cf. Deutsche Bahn 2004d; Scherz and Fakiner 2003).

Similarly in Switzerland, in the air rail sector there are some airlines offering codesharing with rail, which includes an integrated ticket for the air rail travel chain.

In some countries like Greece, Denmark or Ireland, examples of ticketing co-operation between rail and ferry operators can be found. In Greece for example, national Greek Railways in co-operation with the ferry operator Attica Enterprises, has developed an innovative product that covers rail and various ferry routes between Greece and Italy. Passengers wishing to travel from any Greek destination serviced by rail to a destination in Europe can purchase a single ticket that includes the ferry trip. Tickets can be purchased through the railway ticketing network or travel agencies. The Attica Enterprises ferry company is a member of the International Union of Railways and participates as a full member in all its Adriatic routes in the following international rail offers: Eurail, Eurailticket, Interail and Eurodomino. These routes are treated as railway lines for booking and information purposes and fare revenues are allocated through the Bureau Central de Clearing (BCC). In Denmark it is possible to buy combined train and ferry tickets including local buses to the islands of Fanø, Samsø and Bornholm. In relation to Bornholm it is also possible to travel with a combined long-distance bus service and ferry via Sweden.

Another field of interest is the fare and ticketing co-operation between rail and taxi which is available in the Netherlands and Sweden. For details on these examples see Chapter 2.5.3.

Ticket co-operation for car parking and public transport are rare, but should not be forgotten, as the dominant role of the car requires a stronger integration of this mode into travel chains. One example can be found in Spain. In Barcelona an integrated park and ride services enables rail users to obtain a combined ticket for the use of the RENFE (national rail) station car parking and local rail services.

The topic of ticketing and fare integration booking and payment procedures are an important element of intermodal passenger transport. Again, the picture regarding this field is very heterogeneous within Europe or even within single countries, reaching from user friendly concepts to totally antiquated systems. Good practice is available from many countries, these examples show that booking and payment can be made convenient.

In most countries you can buy a ticket before travel from either a driver or ticket machine, or in an office. However, some more innovative forms of booking and payment are evolving. Internet and phone booking/payment for example is already widespread in many Western European Countries.

The national Swedish system, "Resplus", includes ticketing and travel information. Travelling with Resplus means that the traveller can purchase a complete journey operated by different train companies. Moreover, the traveller can get information about purchasing tickets for buses and trains run by the regional public transport companies. The Resplus system covers 3,000 locations (www.resplus.se) The inter-regional express buses are not included in this system at the moment, although integration is being discussed together with the integration of flight/rail ticketing.

For long-distance train journeys in the UK, many train operator's offer telephone booking and Internet booking of tickets, as well as the purchase of tickets from machines and offices at train stations. Not all have their own Internet booking system however. Arriva Trains Northern has a link to qjump.co.uk which is a specified website for booking and purchasing train tickets. A similar website which has the same function is the trainline.com, which is a fully impartial service, giving users access to the full range of over 293 million journey and fare combinations within the whole of the UK and through all Train Operating Companies (TOCs). Other TOCs allow customers to purchase tickets directly through their own website. For example, GNER allows tickets to be purchased on their website for journeys which do not include GNER services.

Regarding pricing, an interesting example can be found in Austria, where best price ticketing in the cities Wels and Steyr is available (BMVIT 2003a, BMVIT 2003b). In operation since 2001, the system is based on a contact less smart card which will identify and subtract the best price (according to the trip length and especially previous journeys with public transport). This is a benefit for both seldom users (who do not have to know the tariff system) and regular customers (who will not run the risk of not using their pre-paid pass due to illness or holidays). 85 % of the customers judge the system as good or very good. Ridership has increased by 2,5 % over one year. The system will be extended to regional public transport. It is not intermodal but could be extended further.

The PEGASO program in Italy, implemented by the Tuscany Region since October, the 1st 2002. Passes and subscriptions allow travel using all buses, coaches and trains across the region. Fares are based on travel lengths and they are valid for every trip, whatever mode is selected by the customer. Twenty three companies participate to PEGASO involving about twenty municipalities. To buy passes and subscriptions it is necessary to purchase the PEGASO card (6 Euro).

2.7.4 Overview and description of main factors of success

Due to the heterogeneity of transport markets and framework conditions in different European Countries it is not easy to determine overall valid factors of success. Furthermore the national inventories often are descriptive in what happens in ticketing, fares, booking and payment and lack an in depth ongoing analysis of success factors and barriers. However, certain elements that contribute to a positive development of ticketing issues can be identified.

As already mentioned the main obstacles in this field are not technical but organisational. Obviously many forerunner countries have as success factors a solid basis of technological development in this field and in many cases are active in research and development. This requires financial resources either from the government or the private sector. Many countries, especially in Eastern and Southern Europe lack this technological base within their own countries and do not have large financial

budgets to buy external products and services that are available in the forerunner countries.

Apart from the technological and financial base, both in forerunner countries and in weaker countries, organisational barriers are even more important. How did certain countries achieve a relatively high quality in ticketing, fare integration, booking and payment? Firstly, most countries with such success stories have a real market for public transport, and key players, especially the government and public transport operators, push the introduction of such systems. Countries like the Netherlands and Denmark for example, have a strong consensus oriented culture, and public transport innovation are pushed by the government and the operators. It becomes obvious that win-win situations have to be created, showing each operator an individual benefit. In the Netherlands, a nation-wide smart card system will be introduced and cost/ benefit studies regarding this have been carried out, showing the many advantages which such a system will have. Cost savings through more efficient ticketing, better service for the passenger (and hopefully increase in ridership) and better revenue sharing concepts can be seen as some of the main advantages making such a system attractive for all participating operators. The advantages that can be seen clearly from the network approach must be visible for each participant of an innovation.

Revenue sharing is a critical point with regard to the integration of fares and ticketing systems. Smart Card systems may contribute to a better handling of such questions in the future. However, many positive examples like the Italian “Sistema Tariffario Integrato – STI” or the German “Verkehrsverbünde” (Public Transport Association) proof that – also in larger regions – it is possible to bring together many different stakeholders and to achieve solutions for such problems using still conventional ticketing forms. As the good practice examples highlight, there are a variety of ways the problem of revenue sharing can be approached and tackled.

Government funding and support is important in starting new initiatives like the PLUSBUS initiative in Scotland which received support from the Scottish Executive. Research funding and support is also important to push a topic, as the case of Austria shows. The European Commission also contributes to a positive development for example in border-crossing transport, or the application of innovative technologies (many projects across Europe). Pilot projects may prove the feasibility of a technology and lead to long-term implementation.

Standardisation is an important issue, especially regarding electronic ticketing. The case of Germany shows that the establishing as a common standard for Electronic Fare Management is possible and gives a necessary framework for high investments (this is however a critical point, as a common standard does not solve the problem of financing). The Federal Government, the Association of German Transport Undertakings and VDV pushed this initiative.

The opening of transport markets to competition, according to EU regulations, includes many challenges, as it may lead to a more heterogeneous public transport market which includes the danger of less integrated ticketing and fare systems. Belgium is a positive example of how this issue is been dealt with, where a central operator is responsible for aspects like the tariff systems and guarantees an integrative approach.

2.7.5 Overview and description of main barriers

Despite the many good practices in ticketing, fare integration, payment and booking, it cannot be hidden that the overall state of such systems in many European countries is still poor and an integrated European solution is still far away.

There is no European through ticketing service available. Intermodal solutions that include modes outside rail or regional/ urban public transport are very rare. Even integration within the field of public transport is still often quite weak, which is a severe barrier for many travellers. Many fare structures are as heterogeneous as the public transport market with single operators often having their own system in place. Certain modes like long-distance coach lines e.g. are mostly completely isolated from other transport modes in terms of ticketing and booking.

Border-crossing systems are rare and passengers face many problems in ticketing when making a border crossing trip by rail or regional public transport, which is an important barrier for European seamless travel.

As in many countries, in Belgium the most lacking point is the absence of a transparent cross border rail tariff. Borders are never far away, which makes the topic important. There is poor integration between HSR services and conventional Belgian or German trains. Between Brussels and Cologne you have to make a fixed booking for a certain time if using the Thalys High Speed Train. The ticket is only valid on the booked Thalys. So you do not have the option to take another train if you are late. It can be quite difficult to find conventional rail services that take you from one side of the border to the other with a ticket that does not give you flexibility in terms of which train you take. This is so much worse as the distance between Belgium and Cologne is a rather short HSR distance. Missing a train means to buy another expensive ticket, not to mention the last train which runs quite early.

As with cross-border transport, a similar problem is experienced at the national level. Most countries do not provide the traveller with a one-stop (at least two-stop) approach to booking, paying, and ticketing for a whole travel chain. Eastern European and Southern European countries are particularly weak, but Western European Countries like France also present unsatisfactory conditions. Regional and local level fare and ticket integration is missing over wide parts of Europe. France for example provides good integration for the Île de France region (Paris), but many other areas only provide a marginal co-operation in this field.

Extreme cases of user-unfriendly booking and paying services can still be found in many countries. In the Slovak Republic for example where booking and purchase must be made in person, and within Northern Ireland, train tickets can only be purchased at the station on the day of travel, with no pre-booking available either online or via the telephone[19].

As a result of the national inventories it has to be stressed that the main barriers for the introduction of a seamless travel experience regarding ticketing, fares, booking and payment are not technical but organisational ones. Good practice shows that necessary technologies are already available and developing fast (although not always based on a common standards). The main obstacle is a lack of co-operation. Many stakeholders with different interests make co-operation within the mentioned fields extremely complex. Public transport markets in many areas are very hetero-

[19] However, first class travel from Belfast to Dublin on the Enterprise can be booked in advance.

geneous, and this is the case for very different parts of Europe, like Hungary as well as for certain regions of Switzerland.

The problems of revenue sharing is still one of the main reasons why operators refuse to co-operate in an integrated tariff and ticketing scheme. The introduction of smart card systems is connected to the hope that it will be easier to obtain the necessary data to achieve a well designed concept of revenue sharing. However, one has to be careful as the smart card development may be too optimistic. In the Netherlands the introduction of such a system worked, but the costs are considerable and may, especially for larger European countries, be within the range of billions of Euros for one country. For reasons of financing Switzerland skipped the introduction of such a system, and in Germany, where standardisation activities prepared the basis for the introduction of a nation-wide system; this topic is also discussed very critically. If a country like Switzerland cannot afford such a system, how should Eastern European countries make such an investment?

The opening of transport markets to competition, is an evolving topic, which may build up even more barriers for integrated ticketing and fare systems. This can already be seen in the case of Germany where, especially in regional rail transport, different fares and ticketing systems are used by new operators entering the market. The forces of the market are not contributing to integration in this sector and a legal or regulatory framework to adjust this lack is widely missing. In other cases like Poland, a complicated legal system regarding the distribution of subsidies is an obstacle to co-operation in ticketing and fare setting.

In the context of a liberalised market, the negative effects that competition laws may have on co-operation in ticketing has to be mentioned as an important barrier. This is the case in the UK, where competition law has originally been introduced to prevent anti-competitive behaviour of bus companies. The Office of Fair Trading (OFT) applies competition law to the bus industry and the two particularly important pieces of legislation applied are the Competition Act 1998 and the Transport Act 2000 (and Transport [Scotland] Act 2001). Ticketing schemes between bus operators will often breach the Competition Act. However, the OFT has introduced a block exemption for certain ticketing agreements between operators if certain criteria are met.[20]

[20] The block exemption applies to:

- Multi-operator travelcards
- Multi-operator individual tickets (MIT)
- Through tickets
- Long and short distance add-ons

Such a ticketing scheme must:

- Be open to all operators
- Allow money to 'lie where it falls' if the scheme is MIT
- Remunerate operators on the basis of passenger miles if the scheme is a travelcard
- Allow operators to make individual decisions about number of vehicles, headways, timings etc
- Be accompanied by 'own brand' singles and/or returns if it is an MIT

A ticketing scheme must not:

- Limit the variety or number of routes offered by individual operators
- Limit the price or availability of any single operator ticket
- Limit the frequency or timing of any service operated by individual operators
- Facilitate an information exchange between parties, except where this information is indispensable to the scheme and conducted in an open and transparent way
- Allow price fixing for tickets, except travelcards

Besides the general concerns of large scale-co-operation, the promotion of better ticketing, booking and payment services faces many smaller barriers. Certain regions that made a step towards the integration of the fare systems face the practical problem that they still have tickets of various sizes and formats in place, which makes interchange sometimes complicated. This is for example the case in the Barcelona and Île de France regions.

In the country report for Italy another important aspect is mentioned. Dedicated services to special categories of vulnerable users, mainly the elderly, are missing in many ticketing systems. Not only in Italy but in many other countries, it can be seen that modern ticketing services are not accessible for certain user groups like elderly people. Scenes of elderly people trying desperately to use a modern touch-screen ticket vending machine in stations without service counters are common. The dismantlement of personnel services should be realised also in its negative dimension.

Another point to be mentioned is the lack of information on fares in passenger information systems. Many information systems are not able to provide fare information when different operators or modes are involved in the requested travel chain. This may already be sufficient lack of information to let the passenger make the choice for the private automobile. Information and ticketing go hand in hand and a one-stop-approach has to be the goal when aiming at providing a really user friendly system.

2.7.6 Short category conclusions and recommendations

As already mentioned the state of ticketing, fare integration, booking and payment systems is very heterogeneous within Europe. Some forerunner countries like the Netherlands, Denmark, Belgium or Germany already provide a relatively high quality regarding these aspects, although they are far from being perfect. When aiming at a system that is user friendly for the European intermodal long-distance traveller a lot of work remains. Many of the good practices can be found on the regional and urban level, but may be transferable to the long-distance dimension. However, especially in many Eastern and Southern European Countries ticketing systems, fare integration, booking and payment can be characterised as antiquated, lacking totally behind to what is already common standard in many other countries. Those countries will have to make considerable efforts to reach a decent status of only unimodal regional systems, whereas forerunner countries can make the further step towards real intermodal and nationally (or even European) integrated systems, using innovative technologies.

Particularly weak is the European integration of ticketing and fare systems. There are many good examples of available technical solutions that could solve this problem, but organisation especially where border-crossing issues are concerned, is a challenging task.

Many of the national country reports recommend to establish door-to-door through ticketing on a national and European level. The introduction of smart card systems is seen as a way of promoting such an integration, and to solve difficult problems like revenue sharing. However, costs are considerable, and some experts warn against focusing too much on expensive smart card systems. Alternatives like the use of booking and ticketing by normal cell phones, should be evaluated. Reliable cost/ benefit studies are a must to evaluate such concepts. Furthermore the use of highly developed technological concepts by vulnerable groups like elderly or impaired people have also to be evaluated, as many people are not able or fear to use these technologies.

Standardisation activities are mentioned as an important element of promoting innovative technologies. Particularly because of the high investments that are already made in e.g. smart card systems in the Netherlands or on regional and urban level, standardisation must be sped up if the chance for a European integration of such systems should not be missed.

Another important field which requires action is the opening of transport markets to competition, which may lead to more heterogeneous ticketing and fare systems as well as booking and payment procedures, which may pose a severe barrier for the intermodal passenger. Concepts how to design regulatory and legal frameworks to handle this problems are still missing in most countries. The hope for better services for the passenger by creating more competition may be foiled by heterogeneous structures in important fields like fare integration.

In some country reports the promotion of innovative concepts among passengers have been mentioned as recommendations. Indeed many good solutions that are available could be used much more, if potential clients knew of them. Much of the time the focus of projects is to implement innovations on the technical side and not enough attention is paid to the promotion needed so that passengers feel encouraged to really try them.

Finally what has been included in many country reports and is worth mentioning was the recommendation to have generally low prices for public transport in place, as the best fare integration and ticketing system is useless if high public transport prices, especially for the occasional user, discourage the use of public transport. This is also the case for many border-crossing connections.

2.8 Baggage Handling

2.8.1 Introduction

The handling of baggage is an important user concern during intermodal journeys which are characterised by the need for interchange between modes. Carrying baggage from one mode to the other is a major inconvenience and a forceful disincentive. It is a specific burden for the elderly, travellers with children, persons with impaired mobility and those with heavy luggage. A lack in baggage handling services can act as a serious barrier to intermodality, especially for these groups.

User needs are quite clear: travellers want convenience, flexibility, freedom, safety and economies of time. The majority of users support a door-to-door service and are willing to pay for such a service(EuroTracs 1997). But is this enough to develop a market for high quality baggage services? How has baggage handling developed in the past? Are there intermodal solutions or does each mode care for itself?

2.8.2 State of the art

The inventory across Europe has shown that the situation for baggage handling, especially from an intermodal perspective, is rather poor at this point. In most countries the responsibility to carry baggage is solely with the passenger. Existing baggage services are often offered separately for each mode with little interaction, so that a true seamless journey with regard to baggage is not possible.

But the situation differs within different countries. In Eastern Europe, Southern Europe and also Ireland the principle "user carries" is prevalent in most cases. Intermodal baggage handling is not an important topic, baggage services are mainly conventional and unimodal (e.g. station-to-station for rail, within the air system etc.). In Italy, for example, it was mentioned that baggage services have actually decreased in the last few years. An example of good practise is the city check-in with baggage handling to Madrid airport or the baggage service from the cruise ship to the airport in Heraklion, Greece (see below).

Slightly better is the situation in the Benelux states, the UK and the Scandinavian countries. In Scandinavia intermodal baggage transport is not a specific focus. The good accessibility of terminals and stations and well-developed baggage handling in the bus sector (Finland) are strong points which improve the situation for the traveller. The Heathrow city check-in is a good example from the UK.

The best practises were found in the central European countries, Germany, Austria, Switzerland and France. Here, the railway companies often in collaboration with courier services offer door-to-door baggage services. The door-to-door principle is respected although the market is small and consequently prices are high. The co-operation between air and rail with regard to baggage handling is at its most sophisticated in Switzerland and Germany (see below).

Several good practises are described below. These are first innovations but they cannot hide the fact that intermodal baggage services are the exception and not the norm. The numbers of barriers are still higher than the success factors, so there is a need for further work.

2.8.3 Selection and short description of good practices

The analysis throughout Europe of the current situation in baggage handling has uncovered that intermodal baggage services are lacking in many countries. Often the responsibility for baggage is with the passenger; in most cases services are only offered by each individual mode separately.

Trolleys in stations and airports seem to be a normal standard but not everywhere. In Denmark, for example, there are no baggage trolleys at stations. Traditional services such as baggage porters at stations have gradually disappeared. In the analysis these services were only mentioned for a few countries, e.g. Germany (19 larger rail stations) or Lithuania. These services have not been referred to in all cases, as they are not intermodal as such. Porters in stations can of course support an intermodal journey with rail as the main mode.

Good practices in baggage handling are those services that reflect the customer need for a door-to-door service or that combine baggage handling across two different modes:

a) door-to-door baggage transport

The transport of baggage from door-to-door is the most convenient service, as the customer does not have to bother with the handling of (heavy) baggage. Under market conditions such a service is often costly and needs to generate sufficient demand. But we already see some preliminary stages to a full door-to-door coverage.

In the Czech Republic the Czech railways offer a station-to-station baggage transport, which eliminates the need for the passenger to handle baggage during interchanges. In Switzerland the Swiss Federal Railways (SBB) offer a check in of baggage at all stations. Arrival of the baggage within one and a half days at the destination station is guaranteed (within five days to addresses and/or stations in Germany, Austria, France and Luxembourg). Costs per piece of baggage is 10 CHF (20-44 CHF for international services) and families and groups obtain a discount of 20 %. SBB sees a decrease in volume (currently 400,000 pieces a year) due to trolley baggage with wheels. Many people are able to handle their baggage themselves, which affects the cost efficiency of the luggage service.

In Italy Trenitalia S.p.A., in agreement with TNT (a national courier), offers a service from station-to-door. It is possible to have your baggage delivered to any location from some departure stations. This is an "enlarged" parcel delivery service, which is quite expensive.

In several countries the railways offer a true door-to-door service, often in collaboration with a delivery service company:

- In Germany, German Rail (DB) is offering in co-operation with a courier service, a door-to-door baggage transport service. The service can be purchased in combination with the train ticket and is available within Germany, even to special storage rooms at some large German airports, and for some neighbouring European countries (e.g. France, Austria). Depending on the destination the baggage has to be picked up two to five days before the planned arrival. The prices for the service depend on the number of pieces and destination, e.g. the first and second piece of baggage cost 14,90 EUR each for one-way transport within Germany (Deutsche Bahn 2004c).
- In Austria Austrian Rail (ÖBB) offers a door-to-door baggage service where up to three pieces of baggage will be picked up at home and transported to the destination (1-2 working days in Austria; 2-3 working days to foreign destinations). The service can be booked in all larger stations, via phone and in travel agencies until 17.00 the day before. The cost is 15 EUR within Austria and 30 EUR to other countries for the first piece. Lower prices are available for customers with a customers rebate card (Vorteilskarte) and for additional pieces (ÖBB 2004b).
- SNCF in France will take charge of baggage (from 1 to 4 pieces) from door to door. It costs 23 EUR for the first piece of baggage and 10 EUR for additional ones. The service is also available to Germany and Switzerland.
- In Japan heavy baggage is often sent via parcel delivery service, which is quite developed in this country. This convenient service has a lot of collection agents, including convenience stores. However, information about this service is not well available for foreigners. The parcel delivery services are courier services, but only for domestic delivery. It costs, for example, 840 JPY (~6 EUR) for up to 2kg, and 1890 JPY (~14 EUR) for up to 25kg to send baggage from Tokyo to Osaka. The sender can select the time period to deliver, and both the sender and addressee can trace the condition of the delivery through the internet, including access from mobile phones.

b) co-operation of modes (mainly air-rail)

Intermodal baggage handling is most advanced in some co-operations between airports, airlines and railway companies. A check-in of baggage at the rail station is

possible in several European metropolitan areas, but so far limited to some larger airports and a few connecting rail lines. The degree of service integration differs.

One type of service combines the access from the city to the airport by rail with a city check-in facility and baggage transport. This type of service is offered in London, Madrid and Vienna. It is also planned for Paris.

- The Heathrow Express train service runs from Paddington Station in London to Heathrow Airport. It allows the customer to check-in luggage and collect their boarding card at Paddington, anytime on the day of travel up to two hours before the flight or one hour with hand luggage only. There are currently nine airlines represented in this service: Air Canada, Singapore Airlines, Varig Brazilian, Lufthansa, SAS, Austrian Airlines, BMI, LOT and Thai Airways. While there are similar train services from London to Gatwick and Stansted airports, neither offers the same baggage handling services as the Heathrow Express does.
- The most important initiative in Spain to ease the burden of baggage handling has been the opening of a flight check-in facility at the Nuevos Ministerios metro and heavy rail interchange in Madrid. Passengers travelling on the new metro link to the airport are able to check-in their baggage at the station, which is served by five local heavy rail lines, three metro lines, offices, shopping and parking.
- A new transport service to the Vienna Airport has been started in December 2003. The non-stop express train City Airport Train (CAT) connects the airport to the city of Vienna (Terminal Vienna Central) every half hour. It is a joint venture of the Vienna Airport (50,1 %) and Austrian Rail (ÖBB; 49,9 %). It offers a check-in at the city terminal which is available from 24 hours until 90 min before plane departure. The cost of the CAT ride is 9 EUR – it is not included in the cost of the airline ticket (CAT 2004). To be successful in the long run the CAT needs 20 % of the modal split to the airport. The rail mode used to catch less than 10 % of the air passengers. In the first full year 800.00 customers are expected. So far nearly 200.000 passengers have used the CAT, which is in line with the business plan (VIE 2004).
- Air-rail baggage handling schemes do not exist in France. The planned project of a fast dedicated link between Paris Gare de l'Est and Roissy Airport will implement a check-in at the train station in Paris.

In Greece a similar service exists for the combination of cruise ship and air journeys:

- In the summer 2003 the Port of Heraklion introduced a new service: passengers of cruise ships whose final destination is the Port of Heraklion in Crete can have their baggage checked at the port and thereafter avoid the check-in at the airport. Employees of an airport baggage handling company carry out the screening and transport the baggage to the airport. Port police supervises the screening. An added benefit for the tourists is that they have more available time to explore the city before the departure of their flight. The port managing company provided the funds for the x-ray equipment. The service was offered for free the first year and when the port proposed a fee the tour operators reacted and the service remained free the second year.

A step further with regard to the integration of air and rail are those schemes where rail acts as regional or national feeder to the airport or even replaces a short air leg of the total journey.

- In Germany (AiRail) and Switzerland (Fly Baggage service) the most advanced schemes are being operated. The Swiss scheme offers integrated baggage handling from 50 stations to three airports. In Germany the service from Stuttgart and Cologne to Frankfurt airport includes not only remote check-in but also integrates the ticketing under a code-share agreement. Please refer to chapter 2.9 Integrated Services to read more about these highly integrated services.
- A similar co-operation between Air France and Thalys for the Brussels-Paris route includes a check-in at the Brussels-Midi train station. Baggage is tagged but still needs to be handled by the passenger in the train and at the airport (with assistance by Air France agents). Thus it cannot be considered a good practise with regard to baggage. The same service is under negotiation for the HSR station Antwerpen Centraal from 2006 on for flights from Paris-Roissy and Amsterdam-Schiphol. Rail company SNCF is co-operating with several airlines on codesharing and integrated ticketing with the TGV network from Paris. Baggage, though, still needs to be carried from the airport to the train by the passengers themselves.

2.8.4 Overview and description of main factors of success

With regard to baggage transport a main factor of success is the attention needed regarding the door-to-door principle, which is highly relevant for certain customer groups. A door-to-door baggage service is available in many countries but faces difficulties in offering a service at a price which customers are willing to pay. With a higher share of baggage supplied with wheels, the handling is more convenient, so the share of customers demanding a full service declines (Krebs 2004).

The good accessibility of all stations and terminals (e.g. by elevators and escalators) is an important success factor that enables easy baggage handling for those customers that will transport baggage themselves.

For all integrated baggage services that operate over several modes of transport, good co-operation between operators is essential. Several of the mentioned good practises show that co-operation is a pre-requisite in offering such services. The AiRail service in Germany is based on the co-operation of the airport, the involved airlines and the railway company. For the baggage scheme at the port of Heraklion (Greece) it is the airport, the port management, port police and the cruise ship company that work together. In the bus sector in Finland, for example, baggage handling between several operators for a single journey is satisfactory because of smooth co-operation. In many cases there is not only co-operation in organisational matters but also a joint financing of investments needed to provide such services (e.g. AiRail).

Good framework conditions to achieve co-operation exist in those cases where a specific function or unit exists which has the responsibility for intermodal issues. At the Frankfurt airport, for example, there is a specific unit with responsibility for intermodality. At Zurich or Vienna airport the development of land access to the airport, including rail, is co-ordinated in a specific organisational unit. This is typical for larger airports but not yet standard.

A primary condition to achieve an integrated baggage handling is the availability of specific facilities. Firstly, the condition for air-rail integration is the connection of airports to the urban/regional and national rail network. Then baggage handling facilities are needed at stations; this includes investment and security issues that need to be clarified.

2.8.5 Overview and description of main barriers

The state-of-the-art has shown that the baggage handling across modes is not yet satisfactory in most countries. The barriers can be grouped into the following issues:

- lack of co-operation, modal thinking
- poor accessibility, inconvenience
- insufficient markets
- security concerns
- absence of intermodal regulations

a) lack of co-operation, modal thinking

A major barrier for the development of intermodal baggage services is often the lack of co-operation among the operators. In many cases it evolves from a modal thinking that is solely concerned with the operation of its own mode of transport. This has especially been mentioned for many of the Eastern and Southern European countries. The responsibility for the handling of baggage is left to the passenger with the consequence that the fear of inconvenience will pose a restriction for intermodal journeys.

b) poor accessibility, inconvenience

The lack of a barrier-free environment at stations and terminals is a barrier for those customers which rely on baggage transport of their own. The lack of accessibility was mentioned for Germany and Luxembourg but is certainly also a problem in other countries, especially at smaller rail stations. An inconvenience that has been assessed for many countries is the lack of sufficient baggage space on trains. This is relevant for many urban and regional trains (e.g. in France or Germany) but also for high speed long-distance trains (e.g. Thalys and TGV). The absence of trolleys, e.g. in Denmark, is another inconvenience for the passenger. In Belgium, it has been argued that loss and theft of trolleys make it a costly service for the operator. If there is a door-to-door baggage service in some cases the pick-up of baggage is quite early (a few days in advance), which might not be convenient to the passenger but seems necessary for operational purposes.

c) insufficient markets

A general problem for the development of high-quality services is the generation of a sufficient demand. Highly integrated services for example in the air-rail sector need a high investment, e.g. in check-in facilities. Therefore this kind of service is only feasible for larger airports. For smaller countries it has been argued that such a service is not applicable (e.g. Ireland, Austria - except Vienna). The market for integrated air-rail services is also limited, as there is a substantial share of passengers that will not consider using rail in any case (cf. Germany). For the development of door-to-door baggage services the market penetration of suitcases with wheels has led to a smaller demand for services, as larger passenger shares opt for a baggage transport of their own. A lower demand for the expensive door-to-door service leads to higher prices and lower demand again. It seems difficult to break this cycle.

d) security concerns

Security concerns have been stated in many country reports as a major deterrent to develop more integrated baggage handling (cf. Sweden, Belgium, Netherlands, It-

aly). After the 9/11 incident the discussion about tighter security standards has led to more difficulties in the development of services. A city check-in for the Stockholm airport, for example, has not yet been realised with security as a major problem. Security is an important factor to consider when developing new baggage services.

e) absence of intermodal regulations

In some country reports it was stated that there are regulations for baggage handling concerning specific modes, but not yet for intermodal services (e.g. Lithuania). It needs to be analysed if the lack of a specific regulatory framework can be a barrier for baggage services.

2.8.6 Short category conclusions and recommendations

The analysis has shown that truly integrated baggage services are widely missing across Europe. In most cases the passenger is responsible for the transport of his/her baggage which leads to inconvenience and poses a barrier to intermodality. Good practises have mainly been identified in the area of door-to-door transport and in air-rail co-operation, mainly in the central European countries.

For door-to-door transport the demand has been declining with the market penetration of rolling baggage. Current offers are often expensive. It needs to be seen how an attractive service can be offered that meets the expectations of the passenger with regard to value for money.

A further integration of the air and rail mode is necessary. Due to the high investment a check-in at the rail station is only possible in larger markets. Nevertheless this service can be expanded especially with regard to the city access of airports by rail. A more advanced integration with code sharing and integrated baggage handling to replace short flights only seems feasible for larger hubs (where competition for slots is high).

In the near future, the majority of passengers will still transport baggage on their own. To improve their situation, especially with regard to the use of rail as a main mode for intermodal journeys, a better accessibility of stations and enlarged space for baggage on trains are the main factors that need to be advanced.

In any case modal thinking has to be overcome, which is true for most of the issues described in this report. For baggage handling, co-operation of different operators is necessary. All good practise examples show that this is a primary condition to be met. This is relevant for both organisational matters (logistics) and financial matters (joint financing).

Security questions have to be answered for all integrated baggage handling schemes.

2.9 Integrated services/products

2.9.1 Introduction

This chapter refers, when talking about integrated services and products, to highly integrated concepts, that include different transport modes (not only regarding pub-

lic transport) or include complementary services, and require co-operation of different stakeholders, often using innovative technologies. Therefore it has another focus than integrated topics mentioned already in other chapters (e.g. integrated ticketing).

2.9.2 State of the art

There are only a few good practice examples regarding highly integrated services and products, which can be seen as some of the most innovative and advanced solutions in the field of intermodal passenger transport. Examples can mainly be found in the combination of air and rail, in the field of “mobility packages” (based on chip cards that integrate different modes or complementary services) or in the tourism sector (offering one-stop packages for a whole journey, not very innovative but should be mentioned). Such concepts frequently require the integration of different modes, co-operation of different stakeholders, in many cases the use of innovative technologies and concepts of financing and revenue sharing.

Most of the innovative and highly integrative services and products in the field of air-rail and ”mobility packages” can be found in countries with advanced passenger transport markets and technologies like Switzerland, Germany, the UK, or the Netherlands. For many countries that are still lagging behind in achieving a basic quality of public transport systems, and the use of modern technology as well as organisational concepts such products and service may still be out of reach. However for other already more advances countries the innovations already realised by some innovators seem to be feasible.

2.9.3 Selection and short description of good practices

Compared to other issues, there are relatively few good practice examples of highly integrated products and services in passenger intermodality, especially in relation to long-distance journeys. This may be a result of the complex planning and organisation which is necessary to realise such concepts.

Some of the best examples of highly developed intermodal passenger services can be found in the combination of air and rail, partially on long-distance (Germany, Switzerland), partially as last “urban mile”, also called “city access” type (Austria, UK).

Probably the most frequently discussed concept of true long-distance passenger intermodality in Germany is the AiRail service:

Lufthansa’s AIRail-Service from Stuttgart and Cologne (soon also Düsseldorf) main railway stations to Frankfurt Airport offers a service of baggage check-in and the issue of boarding cards, which takes place in special Lufthansa check-in and check-out facilities within the railway stations. The transport of the luggage takes place in the same train as the one that is used by the Lufthansa passengers and is already included in the combined AiRail ticket (Codeshare of Lufthansa and Deutsche Bahn), (cf. Scherz and Fakiner 2003; Krohn 2004; Aviation World magazine 2004).

The co-operation “AiRail Partners” started in 1998, one year before the AiRail terminal and the long-distance train station at Frankfurt Airport went into operation. Over the years the concept developed to include a variety of services which make it a truly intermodal service. Check-in, baggage transportation, information systems and ticketing are the most important elements. The AiRail service has got a good

60 % usage rate, so further product developments are planned. For the connection Cologne to Frankfurt, more and more passengers are using the AiRail service instead of feeder flights, whose number was already reduced by two flight connections a day (remaining 4 flight connections). For Stuttgart there is a parallel service of AiRail without a reduction of feeder flights. Lufthansa is afraid of loosing passengers to other airlines should they reduce their number of flights, they fear a lower acceptance of the parallel service.

In Switzerland the Fly Rail Baggage service is a service that enables airline passengers on their way to Zurich, Geneva and Basel airport to check in their baggage at 50 train stations in Switzerland directly to final destination and obtain their boarding card. The price per baggage item, which also includes the issuing of the boarding card, is CHF 20,- for passengers travelling in economy class. If checked in till 7 p.m. the luggage is available since 6.30 a.m. at the airport. On the return flight to Switzerland it is possible as well to send the luggage directly to the home rail station by Fly Rail service (cf. SBB 2004e). This is a highly integrated product, applying to regional and long distances, which enables check-in that combines luggage check-in and the issue of boarding cards. The service is well accepted, but currently faces difficulties due to the heterogeneous development of check-in systems that can not be handled easily by railway employees any more (see barrier sections beneath).

In some cities similar services in the air-rail sector are offered for the “last urban mile” (also called “City Access” type). Check-in facilities are available for the issue of boarding cards and baggage check in at larger public transport stations. This kind of service is currently offered at Paddington Station in London in combination with the Heathrow Express train service, at Vienna Central Station in combination with the City Airport Train (CAT) to Vienna airport and at the Nuevos Ministerios metro interchange which offers a connection to Madrid-Barajas Airport. For details on these services see Chapter 2.8 Baggage Handling.

Besides air-rail another innovative field provides highly integrated products and services, mainly on the regional level. Such products and services can be called “mobility packages” and are based on innovative smart card systems. Examples are still few and mostly limited to regional level. However, they show that the integration of various services into one “mobility card” is possible. The concept of “mobility cards”, as previously discussed, enables the easy use of different modes of transportation and complementary services in countries like Germany and Switzerland. Envisioned by some experts is the wide distribution of “mobility cards” with aim to provide significant choice between many mobility services, this would present an alternative to car use. Smart Cards may enable access to various services and can be expanded gradually to reach the state of a comprehensive “mobility package”.

In Germany a good example of an integrated mobility package that spans over two modes of transport is the the “Bremer Karte Plus” which is multifunctional. The card enables electronic payment of public transport tickets, which are directly deducted from the multifunctional chip card and is at the same time an electronic key for car sharing vehicles, which makes it suitable for intermodal trips. Additionally the electronic payment function of the card can also serve shopping activities (cf. BSAG 2004).

German Rail also shows some initiatives to integrate different means of transport like rail, car-sharing (DB-Rent) and the call-a-bike services (see chapter 5). Current developments seem to aim at an integration of such services in one “mobility package” for German Rail customers.

In the Swiss Canton of Zug a fully integrated annual public transport pass (Zuger Pass Plus) is offered which includes several other mobility related services and products. Customers can use taxi and car-sharing at a lower rate, can receive rebates for cycling products and shoes or can take an accompanying person for free on evenings and weekends. There are also other "mobility packages" that combine public transport and car-sharing in Switzerland and are already well accepted. Examples include the Mobility Rail Card 444, this enables the combination of rail and car sharing on long distance, and the ZVV-Kombiabo (formerly called "zürimobil") for the Zurich region.

An already well-established service that includes sometimes different transport modes and complementary services are "tour packages" in the tourist industry. Tour operators frequently provide all necessary tickets and information for a holiday journey out of one hand; including for example, air tickets, bus transfers, hotels, insurance, entrances etc. This kind of service is well established all over Europe, and not really an innovation. However, it is worth mentioning these kinds of services in this section as they are a reflection of the idea of "mobility providers" which could also be established for daily travel purposes. (see section on recommendations).

2.9.4 Overview and description of main factors of success

As the analysis of the national inventories show, highly integrated products and services are still very rare and limited to few countries that have well developed passenger transport markets.

A basic factor of success is the availability of technologies to guarantee well working air-rail integration or smart card based "mobility packages". This is linked to having the initial financial potential to make investments in such concepts.

However, as in most corresponding fields (e.g. ticketing, information), its not technology that limits the development and implementation of innovative intermodal products and services, but organisational questions. Highly integrated concepts require the participation of a high number of stakeholders. One problem is that for intermodal products and services a benefit can often be seen from the network approach, but it is difficult to see the individual benefit for the participating stakeholder. The creation of win-win situations with clear visibility of costs and benefits (financial, image gain or others) for all participants is necessary to realise such innovations.

An example of how a win-win situation could be achieved is the aforementioned German AiRail service. Even if quite successful, this service faces the core question of whether the service offered is financially feasible. The realisation requires a high investment in technical solutions (e.g. to guarantee minimum transfer times of passengers and baggage from the train to the airplane) and service facilities at railway stations and includes substantial operational costs. Regarding the AIRail service, the substitution of domestic short range flights (that lose money) by rail, and the reuse of the scarce slots that were occupied by those flights at Frankfurt Airport for profitable long range flights, contributes to the financial feasibility of services if viewed on a network wide basis. However, the introduction of such services depends on the co-operation of many stakeholders including the railway operators, airport operators and the airlines. Only if a win-win situation can be created and all partners work together, such services can be introduced (cf. Scherz and Fakiner 2003). The commissioner for intermodality at Frankfurt Airport, H. Fakiner, mentions, that the AiRail concept is only a feasible option for large hub airports with scarce slots. These airports represent only a small number of European airports. The main interest of the airline is to bring passengers to their hub and the service is

financially feasible only in this network context. AiRail is a case of the frequently desired “co-ompetition”, a co-operation in a free market between different stakeholders. German Rail may be a competitor to the air industry, especially on some HSR connection, but nevertheless sees benefits in a co-operation with Lufthansa in the AiRail service.

Another factor which contributes to successful implementation, are the key players (also internally within the stakeholder’s organisation) who push innovations. In the case of the German AiRail concept decisions to realise such a service were supported by the CEO’s of German Rail and Lufthansa making it also a political and marketing decision.

Furthermore, what is also important for the success of a highly integrated innovate concept is the knowledge about the market potential. In the case of “mobility packages” this potential seems to be given, at least on a regional level. However, in the future, regional systems could also be extended to national or European services. Within the Swiss national research programme NFP 41, a project called “Neue, integrierte Mobilitätsdienstleistungen” (New, integrated mobility services) has researched the potential of “mobility packages” like the combination of a season ticket for rail and bus transport, and, if necessary access to a car (car-sharing or rental car). The research project showed that between 7 % and 10 % of Swiss driving licence holders would be prepared to test such “mobility packages”. About half of them (90,000 people) would be willing to buy such an offer immediately. Of course the Swiss case can not be compared to other countries, but shows that studies of the market potential for such services give important information as it may minimise risks in a field where many uncertainties of costs and benefits exist.

It should be mentioned that not only cost benefit studies and the market potential are important factors to realise highly integrated products and services but also a real will for innovation and customer orientation, as the good practice examples show. The complexity of such initiatives should not be underestimated, and implementation needs time and motivated stakeholders.

2.9.5 Overview and description of main barriers

The few good practice examples of highly integrated intermodal services and products can not hide that such concepts are still rare in the European context and are not even realistic goals for many countries, where the achievement of a decent standard of conventional public transport is the most important point on the agenda. Many countries with a well developed passenger transport sector however may in time have the potential to realise such systems and may face similar barriers as the forerunner countries.

As already mentioned it is in many cases difficult to identify the market for intermodal products and services or to state clearly if there is a real market for such concepts. Cost benefit analyses are still lacking in this field, which creates uncertainties regarding the necessary investments that may be considerable. Even if there is a clear benefit from a network approach, it is necessary to break down costs and benefits to the perspective of the individual stakeholder, which is very difficult, especially if benefits should be listed in monetary categories. Many benefits may not necessarily increase ridership or revenue, but may for example relate to marketing which can improve the image of the operator.

Even with the successful German AiRaill concept there are uncertainties on how the market can be assessed as a variety of aspects have to be considered. There are

for example various reasons discussed why the AiRail connection to Frankfurt Airport from Cologne is doing better than the one from Stuttgart: e.g. higher frequency of trains from Cologne to Frankfurt than from Stuttgart, very good high speed train connection on new line from Cologne, airport in Stuttgart has the prosperous surroundings of the city where many clients have shorter access to the airport than to the main station. Jörg Last, who examines the question of barriers to intermodal long distance services within his PhD thesis also stresses that certain groups of passengers are not considering rail use at all due to personal preferences and attitudes, and that therefore Airlines will in many cases still offer feeder flights parallel to such services as AiRail if there is demand.

Regarding the AiRail service it is also clear that this concept is only transferable to a few large European hub airports and can not be a solution for the rail connection of smaller airports. Even the “City access” type of air-rail services like in Vienna and London is limited to large airports. All other Austrian airports besides Vienna for example are too small to offer such inner city check-in facilities which need substantial investment.

In the field of highly integrated air rail concepts it also becomes clear that competition and heterogeneous airline structures can pose obstacles as the Swiss Rail and Fly service shows. This widely available service had a growth of user numbers during the past, but currently numbers decrease due to the heterogeneous development of check-in systems of different airlines. Formerly the Fly Rail check-in was handled through the Swissair (now Swiss) check-in system, and it was quite easy for the staff of the railways to handle it. Nowadays many airlines have their own check-in system. Zurich airport for example deals with around 6 different check-in systems, which were introduced by many airlines to prevent Swissair (now Swiss) from processing (and maybe access) their passenger data. Consequently, the heterogeneous check-in systems can not be handled any more by rail staff. Therefore check-in is not possible for all connections any more, this makes passengers insecure regarding the availability of their flight. SBB in co-operation with airports and handling agents is currently developing a common interface called “Maske” (technical mask, interface) for automatic check-in terminals, which enables rail staff to handle the check-in for all airlines through one system. By introducing such a system it would be possible to save the current Fly Rail service, as currently there are questions on how to maintain the accustomed quality of this service.

In the field of “mobility packages” there seems to be the potential for large scale implementation. Many barriers however are linked to the introduction of smart card systems. High costs, a lack of standardised activities and difficulties in multi stakeholder co-operation may be barriers in this field (cf. Chapter 2.7 “Ticketing/fares, booking/payment").

2.9.6 Short category conclusions and recommendations

As already described there are currently only a few truly intermodal products and services that are highly integrated. These initiatives are at the forefront of what is possible in intermodal passenger transport. However, such concepts seem to be limited at the moment to countries with highly developed passenger transport systems. Even in such an environment the realisation of innovative solutions that require the involvement of many stakeholders and considerable investment are facing complex challenges. Questions of financial feasibility, the lack of cost/ benefit studies in many fields and uncertainties regarding the user behaviour are problems to be mentioned in this context. Uncertainties and risks seem to be high for many of the involved stakeholders and large key players frequently hesitate to implement

innovations if the risk involved can not be calculated. Successful co-operations require usually a win-win situation and also a will to be an innovator in an unknown field.

A concept like the German AiRail is widely discussed in the context of passenger intermodality but it should not be seen as a solution that is transferable to many other fields or places. Such a concept can only work for major hubs as described above.

“Mobility packages” seem to be more universal, but questions of financing smart card systems and complex organisational matters may severe as obstacles, especially when implementation is considered on the national and European level.

Cost benefit studies providing a detailed evaluation of innovative highly integrated concepts in passenger intermodality seem to be necessary to reduce risks and create a decision base for operators and authorities.

For the AiRail concept the application of the system, also in long-distance transport, may be feasible for major European hubs (e.g. Paris, London), which should be further evaluated by research projects. The “City Access” type of air rail services already available in Vienna or London may be feasible for many larger airports, however, this also requires further analysis.

In the field of “mobility packages”, the standardisation of activities regarding smart card or other systems seem to be necessary; especially when aiming at a national or European scale of introduction. The transfer of best practice may also serve to spread ideas and the experiences of innovators.

The research team in the Swiss National Research Programm NFP 41 which has dealt with this topic, concludes that "mobility packages" need to be kept simple but need to offer high quality public transport and car rental systems. Improved provision for cycle traffic is also required. Technical systems should be standardised. Furthermore, it is recommended that Communities, Cantons and the Federal Government should increase their support for "mobility packages" (cf. Schad 2001). “Mobility packages” related to a regional improvement in transport, but this provides good insight and an example of integration between different transport modes. In terms of the development of smart card systems, mobility packages valid within inter-city areas are also possible.

Regarding the aforementioned tour packages in the tourist industry, which are already available, and linked to the idea of “mobility packages”, the idea of introducing “mobility providers” could be further developed. The concept of competing “mobility providers” that buy mobility services (rail, car sharing, rental cars, leasing cars, public transport, rental bike, taxi etc.) from the transport operators and sell them to the clients, maybe as an intermodal package, is discussed for example in Germany as one way of promoting intermodal transport chains, as clients would be able to get their mobility out of one hand. Competing mobility providers would have a real interest to offer their clients the most attractive mobility combinations. However, there are doubts if such a mobility provider service would be financially feasible. Nevertheless it is worth to further investigate such ideas.

Planning and Implementation

2.10 Planning

2.10.1 Introduction

The following issues are important with respect to the planning of intermodality.

User needs assessment. At the European level numerous research projects have developed methods to assess user needs for information, interchanges, ticketing, luggage handling and accessibility. Such comprehensive user-needs specifications and design guidelines have rarely been transferred consistently to a national level methodology or standard.

Network approach to planning. Interchanges and single mode networks are often planned and designed with a very site-specific or local/regional focus. A network approach to planning with priority levels and common standards is still often lacking. A more strategic approach could support the functionality of the single interchange as well as the transport system as a whole, this would make modal transfer easier for the passenger. European standards with regard to signage or accessibility would improve the general usability of interchanges.

2.10.2 State of the art

User needs assessment

The opinion on the current situation, with regard to the assessment of user needs, differs a lot between the national experts. 7 country experts argued it was simply too difficult to give an answer. Half of the remaining country experts were satisfied with the user needs assessments in their country. The other half of the country experts found this aspect rather hindering or a barrier. Almost all national experts agreed on the importance of user needs assessments in planning intermodality investments.

None of the 29 countries have standardised methodologies or guidelines available to measure the user needs for intermodality products and services. Nor are User needs assessments a commonly used tool in preparing intermodality investments. This however has not prohibited some good experiences of individual investments in intermodal information and ticketing systems (e.g. Italy, Austria, Germany, Netherlands, Great Britain, Switzerland). In some countries user needs assessments were integrated in the planning phase of investments in interchanges and in new transport links (e.g. the construction of the new Zurich Airport terminal in Switzerland, The Copenhagen metro in Denmark and in Finland for the introduction of 22 travel interchange centres). In some national research programs on transportation, explicit support for research projects in this field is budgeted (e.g. in the PREDIM program in France, ARTIST in Italy and NFP41-research program in Switzerland).

Intermodal Transport Network Planning

From the national expert assessment of the status of intermodal transport network planning, we learn that it is not an obvious issue. Only 15 country experts out of 27 can reconcile a network approach with intermodality. The other country experts perceive the existing transport network approach as a hindering factor or a barrier. Nevertheless almost all country experts agree on the importance of this issue.

The better intermodal transport networks seem to exist in the Scandinavian countries, Austria, the Netherlands and Switzerland. In other countries, the transport network planning merely follows sectoral unimodal lines (rail, bus, etc.) with here and there however good local examples where the sectoral thinking has been left aside (e.g. Germany and GB).

2.10.3 Selection and short description of good practices

User Needs Assessment

The permanent monitoring of customer needs and satisfaction of public transport users, by the government or by a private operator, is very common. But intermodality is never considered. So, there is no permanent monitoring of intermodal trips on a national level anywhere. Sometimes, this happens on a local or a regional level, e.g. in Madrid, where a transport Consortium exists. Within the Madrid region, intermodal data collection and analysis of passenger' journeys are carried out in order to guide transport improvements.

Good examples of projects where the focus is on 'user needs' are the BORIS-project in Austria and the INVERMO-project in Germany.

The Austrian BORIS project (User oriented Travel Information Systems, 2003-2004) analyses the user needs of different target groups regarding door-to-door information systems. It is focused more on the user than on technology and asks for the context of use, typical trip chains, information nodes, suitable media and possibilities for interaction (CURE 2003).

Another interesting project in this context is the German project INVERMO (Intermodal Network Integration). The main purpose of this project is to encourage and increase intermodal transport proposals with a focus on long distance transport. In this project, 10.000 persons were interviewed, and this information was used to build a model of user-demand. The project found that there was an imbalance of transport demand in the long distance market (10 % of the population make 43 % of all long distance trips). This information is important in helping to encouraging intermodality according to user demands.

In Japan, the user needs are fixed by law, the so called "Barrier-free law". This law stipulates standards to improve passenger facilities, such as pathways and easy-to-use facilities of guidance (see 2.4.3).

Intermodal Tansport Network Planning

Network planning within one mode is very common, especially for railways. But intermodal network planning is less common.

The simplest form of intermodal network planning is the park and ride system. This aspect gets special attention in Portugal and in France (e.g. Paris Roissy), where they have special research about the integration of urban interchanges within a city.

In Belgium, intermodal planning is formalised by ARIBUS: there is a signal for the bus driver at the bus stop; this is linked with the train platform signals. It displays a unique four figure-code after modal connection has been made which then gives the bus driver permission to leave the stop.

Another good example can be found in Switzerland, where they have simplified and co-ordinated the bus and train services to stimulate intermodal transport (Bahn 2000, see 2.5.3.2).

In general, a lot of countries have a planned multimodal network on paper, but it seems difficult to implement (e.g. in Italy, Portugal, Sweden, Austria, Switzerland, Hungary, Lithuania).

Integration of Land Use Planning and Network Planning

The link between land use planning and transport planning is a relative new development. Some countries are already active in this field like Norway, Finland, Germany, Denmark, Switzerland. Several other countries now have plans in that direction, but most of the plans still have to be realised (e.g. Spain, France, Norway, Belgium, Bulgaria, Czech Republic, Great Britain, The Netherlands).

The most stringent applications can be found in the Copenhagen area (areas within 1000 m of an important station are reserved for town functions with many visits) and in North Rhine-Westphalia (new public housing has to be located within 1500 m of high quality public transport).

2.10.4 Overview and description of main factors of success

A main factor of success is the density of population in an area. The best cases of intermodality are to be found in urban areas. In these areas, there is high potential for several public transport networks. This high potential encourages a high number of public transport connections. The higher the frequency of connections, the easier it is to create good intermodality. The problem of private car use in urban areas is an extra stimulus for promoting intermodality.

Another factor of success is co-operation between numerous levels of local and national government authorities and between operating companies. This is a complex matter as responsibility is spread over many authority departments and operating companies. In several successful cases, there is a co-operation in the form of a Transport Consortium (e.g. Spain) or in the form of agreements between several operators (e.g. Belgium).

2.10.5 Overview and description of main barriers

The biggest barrier is the competition between the companies. For this reason, they are reluctant to spread figures and information about their services. And sometimes they oppose against intermodality because they are afraid they will lose costumers to other transport modes.

A second barrier is the co-operation between national and local authorities. This is the case for transport systems and for integrated planning. The problems are most visible where national infrastructure (e.g. railway) needs to be linked into regional or local infrastructure (light rail, metro, bus).

A third barrier is the density of population in rural areas: demand is too low to set up a good intermodal transport system. The only form of intermodality possible in these regions will occur between the car and public transport. In Austria, they are doing research on intermodality in relation to on-demand transport systems.

A fourth barrier is the current condition of the public transport network in many countries. Some countries with poor public transport networks are concentrating on the provision of monomodal improvements prior to thinking about measures that encourage intermodality.

2.10.6 Short category conclusions and recommendations

User needs assessments in planning intermodality products and services are not common practice. At this moment, monitoring of user needs and satisfaction is still undertaken on a sectoral level; each operator (rail, bus, ..) measures the needs and satisfaction of their own customers and is not very inclined to share this (confidential) information in order to help make a case for and to justify new intermodal investments. A solution could be the investment, by national governments, into high quality data collection on user perception, needs and satisfaction. This requires a good knowledge of the market for intermodality (see section 2.1). The results and methods developed in national research programs should be compared and fine-tuned. The existing practices on user needs assessments for interchanges, info systems etc. should be collected and benchmarked. A standardised European monitoring system could be of help.

The biggest challenge in terms of intermodal network planning is the co-operation between the several transport providers and operators and also between the several levels of local, regional and government authority. Firstly, it is important that the national, regional and local authorities agree on the concept of the network and the potential for intermodality. Secondly, they should create a platform to help the private companies with intermodality. The companies themselves are not inclined to stimulate intermodality because this needs investment, which doesn't seem very profitable at first glance.

2.11 Co-ordination and co-operation

2.11.1 Introduction

The multi-stakeholder nature of intermodal interfaces is possibly the greatest barrier to the development of intermodality. There is a requirement for co-operation between all modes (e.g. road and rail), between network levels (European, national, urban) all with their own responsible single modally focused planning and regulatory institutes and operators, who all have their own priorities (long-distance travellers, who have specific needs, are not the main priority of urban public transport companies for example). There are few long-distance intermodal organisations (partial examples might include interchange managers, urban-regional public transport organisers, some mobility centres) which means that there is no strong

and impartial driver or co-ordinator for long-distance intermodal development or any formal co-ordination of frameworks. Some specific issues are as follows.

Disaggregated ownership of transport operators & providers/interchanges might hinder the growth in the market share of passenger intermodality.

There might be some barrier because of a lack of *co-operation between subsidised (such as national rail) and commercial transport* (such as taxis or air carrier).

Interchange management. The mere addition of quality elements of any interchange does not automatically lead to a functional transfer point. Several operators and sometimes more than one owner are involved and their services need to be co-ordinated. Clearly structured interchange management is an important task which is sometimes neglected or difficult to implement. Integrated management is especially needed for a coherent handling of disruptions and emergencies. There are acute intermodal passenger information requirements, real-time timetable management and even emergency management.

Common management of disruptions presents particular problems of communication, management hierarchy, service planning and conflicting priorities where there is only horizontal co-operation of different operators, perhaps an air carrier, national rail operator, urban public transport operator or interchange manager.

Data sharing. Of special interest to this study is the sharing of data. Data needs to be shared between operators, authorities, passenger information services, timetable and ticket providers. The free flow of information is also required in order to divide revenue between operators. On long distance and cross-border journeys we see a combination of different operators, the organisation and co-ordination of data sharing is an important link in the chain.

2.11.2 State of the art

Five key issues relate to the category of co-ordination and co-operation and its favouring/hindering effect towards passenger intermodality. The national experts have been asked to provide a general assessment of these issues (see the list in the table below)[21]. Overall, the current state of co-ordination and co-operation is considered to be more of a hindrance than a facilitator to passenger intermodality. With the exception of the management of interchanges, the issues are cited more as a barrier than a success. In many countries however, experts find it difficult to give an overall assessment of the situation regarding co-operation and co-ordination.

[21] The expert assessments of the status of intermodality in Latvia and Malta are missing.

Expert assessment on following issues .	(rather) factor of success	(rather) a bar-rier	difficult to say
1. Co-operation between subsidized and commercial transport	7	14	6
2. Co-operation between operators and authorities	13	13	1
3. Cross border co-operation	10	12	5
4. Interchange management	9	12	6
5. Management of disruptions	4	18	5

Co-operation between subsidised and commercial transport is generally considered as a barrier or hindrance, the opinion of 14 of the 27 country experts. It is considered a factor of success in Estonia and Luxembourg, and rather facilitating in France, Ireland, Italy, Finland and Austria. In terms of co-operation between operators and authorities, the opinions of the experts are equally split between rather facilitating and rather hindering (13 countries each).

Co-ordination between different partners is an important part of developing intermodality in Denmark. Some examples are park and ride facilities, travel information systems, ticket co-operation as well as co-operation at terminals and stations. Furthermore, there is intensive co-operation between Denmark and Sweden in relation to the Øresund area on traffic issues (ticket co-operation and timetable information). There is also co-operation in the region in relation to policy and information about taxes, possibilities to take residence in one country and work in the other, together with cross border transport.

In terms of cross border co-operation, the assessment demonstrates that this is a barrier or hindrance in 12 countries. It is rated as a success in Estonia and Luxembourg, and as rather facilitating in a further 8 countries: the Slovak Republic, Hungary, Italy, Denmark, Czech Republic, Sweden, Great Britain and Lithuania. The picture is fairly mixed with regard to interchange management. It is considered a success in the countries of Norway, Denmark, Sweden, Finland, Luxembourg and Estonia, whilst a facilitator in Ireland, Italy and Great Britain. However, it is regarded as a barrier or hindrance in 5 countries.

A good European example of cross-border rail operation is evident in the case of Luxembourg, as operators from the neighbouring countries, France, Germany, Belgium, penetrate as far as Luxembourg's main railway station. Foreign train sets operate on the local network, although unfortunately international trains are decreasing, and this shows that cross-border co-operation still needs to be improved. In France, the Intermodal interchange of Limoges (CIEL) is a good example of intermodality co-ordination. Each management mission is arranged by a convention, which defines the modalities of organisation of CIEL. There are seven missions: reception and information, traveller's direction, cleaning, ticketing, safety, security, maintenance.

The very high number of local operators is one of the main issues that affect the process of co-ordination in Italy. Difficulties (such as segmentation of operative fields, lack of competition, inertia to find partners related to other modes, etc.) are

met in spite of the Transport Ministry's support at the political level. Cross-border co-operation, as far as passenger intermodality is concerned, is not a priority issue, mainly due to the poor commuter traffic across borders, but also because it is seen as a monomodal, long-distance trip matter. In this particular case, in Italy, disaggregated ownership plus short-term commercial consideration do not help in finding common directions for intermodality improvement.

There is a very clear view that the management of disruptions is working against facilitating passenger intermodality. A total of 18 countries stating that it is either a hindrance or barrier (split equally). Only in Luxembourg and Estonia is it considered a success, whilst it is rated as rather facilitating in Italy and Switzerland.

Data sharing

Data sharing is one of the issues totally dependant on the level of co-ordination and co-operation amongst the different stakeholders, operators, authorities, associations, etc. The fact that the general situation with regards to co-ordination is not very positive at the moment is the reason why data sharing among operators is not well developed either.

Data sharing, which is an important basic requirement for many other fields like passenger information or ticketing, is a highly problematic topic. A good level of co-operation in data sharing issues is still lacking in most European countries, especially in relation to border-crossing operations. Voluntary data sharing works in some cases, this usually concerns the integration of timetable information of non-competing transport operators into common information systems, but nevertheless this is still regarded as poor in many countries. In fields where potentially commercially sensitive information may be required for co-operation, data sharing is usually avoided. This is of special importance in an increasingly liberalised passenger transport market and presents a severe obstacle for better intermodal co-operation. There are only a few cases in which a legal and regulatory framework is provided by the government with aim to facilitate a better data exchange between operators and to promote improvements in intermodal passenger transport.

2.11.3 Selection and short description of good practices

Institutional structure and partnerships to co-ordinate intermodal planning and operations

In France, the SRU Act (Urban Regeneration and Solidarity) of December 2000 is a new tool for the co-operation and co-ordination between different public authorities and other partners. The SRU partnership, which consists of at least two transport authorities, is responsible for co-ordinating services, implementing a multimodal information system, and attempting to harmonise tariffs and ticketing. Today five SRU partnerships exist, including that of the Charente-Maritime which gathers all the public authorities responsible for local and departmental transport. The three fundamental missions are defined as: implementing a single transport ticket in Charente-Maritime, developing intermodality, and establishing a common bank for the transport system. It has led to the development of a mulitmodal travel card ('PassPartout') and an intermodal information system (CIVI).

In Great Britain, Passenger Transport Executives exist in metropolitan areas (e.g. West Yorkshire and Greater Manchester), who are responsible for modal integration, including through ticketing and information. Meanwhile, in Portugal, concerns

over the continued growth in road traffic have resulted in the creation, in 2004, of metropolitan transport authorities for Lisbon and Porto.

In Ireland, Coras Iompair Eireann (CIE) is the parent body of the three (semi) state-owned transport operators: Irish Rail, Irish Bus and Dublin Bus. The main functions of the CIE (as stated in the Statement of Synergy 2003 – 2005 report) are 'to provide or secure or promote the provision of an efficient, economical, convenient and properly integrated system of public transport'. However, there are currently wishes to phase out the CIE and the three companies, and to allow them to operate independently with greater financial awareness.

In Spain, co-ordination at the national level is lacking, but does take place in the areas covered by the Transport Consortiums. These have been established in certain metropolitan and key urban areas, including the whole of the Madrid region (over 8,000 km^2). The overall objective of the Consortiums (see section 2.4 for more information) is to provide administrative, fare and modal integration. The Consortium of principal local transport operators, local and regional government, establishes a legal framework to force intermodal co-operation, and force co-operation between subsidised and commercial operators.

In Sweden, the Swedish Institute for Transport and Communications Analysis (SIKA), is an expert agency that analyses and presents data for planning in the transport and communications sector. Hence, SIKA has established a basis for planning the long term aspects of passenger intermodality. Also in Sweden, Rikstrafiken, the National Public Transport Agency, co-ordinates the inter-regional public travel in Sweden and thus some other aspects of passenger intermodality. Moreover, Trafikverken, which consist of the four administrations road, rail, air, and sea transport, each carry the responsibility for intermodality in their sector.

Interchange management and common management of disruptions

In Denmark, HUR (the Greater Copenhagen Authority) is in the process of building an information system between bus and train drivers to make it possible to co-ordinate operations in the event of delays.

In order to increase the quality of passenger transport interchanges, a Station Committee has been established in Sweden on the initiative of Samtrafiken AB. The Station Committee includes the public transport stakeholders, i.e. railway and other transport companies and the National Public Transport Agency. The primary task of the Committee is to formulate requirements in order to develop the stations into functioning travel centres. The National Rail Administration, the National Road Administration and the municipalities are also taking part in the work.

Cross-border co-operation

In relation to the Czech Republic, the cross-border organisation EUREGIO EGRENSIS consists of the regions Bavaria, Vogtland/Bohemia and Westerzgebirge and aims to ensure better co-operation. It supports cross-border projects between Bavaria, Saxony and Bohemia, covering an area 17000 km^2 with 2 million inhabitants. This organisation has achieved cross-border transport service improvements and within the EUREGIO EGRENSIS region passengers can travel by selected trains and buses using an integrated tariff with single transferable ticketing.

In the Öresund Region between Denmark and Sweden, intensive cross border co-operation is working between the various operators, including ticket co-operation and timetable information.

Eurostar provides direct rail services between London, Brussels and Paris. Eurostar is owned by SNCF (French National Railways Company), SNCB (Belgian National Railways Company) and Eurostar UK Limited. EUKL, SNCF and SNCB are each responsible for the running of Eurostar services on their own territory and each are represented on the board of the Eurostar Group in a unified management structure. Such a corporate structure allows for the full co-operation between rail companies across borders.

In Luxembourg, cross-border rail operation can be considered as a good European example, as operators from the neighbouring countries (France, Germany and Belgium) continue through to Luxemburg main railway station.

The Spanish-Portuguese Cross-border Transport Observatory and French-Spanish Perineum Observatory have been created to improve the harmonisation of transport infrastructure planning and to enhance the connections between these countries and the rest of the European Continent.

Data Sharing

Good practice may relate to legal and regulatory frameworks set by authorities or to voluntary data sharing among operators. However, experience shows that best results can be reached if legal measures are taken, as voluntary data sharing only works in a few countries.

Perhaps the best example for action taken by the government can be found in the Czech Republic, where an electronic National Public Transport Schedule Database (CIS) was set up on the basis of the Transport Act in 1998, which provided a regulatory basis to centrally collect quality timetable information. Local transport offices provide transport schedules to the National Schedule Database in standard electronic form, which ensures a basic quality. The Ministry of Transport is the supervisor and source of the legal basis of the project. There is no financial contribution made by the Ministry, they merely provide rights to the system manager (for resale of data collected and as the sole obligatory recipient of timetable data from operators). The goal is to provide a freely publicly available high quality and up-to date electronic timetable service containing all regional and national public transport lines. More information regarding CIS and its practical use for passenger information systems are given in Chapter 2.6 “Information”.

In the Netherlands, which is one of the few countries with a national passenger information system for public transport, a law was implemented to guarantee the centralisation of data in one database that is used by the OVR 9292 information centre. Experience showed that this centralised data provides high quality passenger transport information and contributes to a high acceptance of the OVR 9292 door-to-door information service that can be accessed by phone or over the internet (also see Chapter 2.6 Information).

Data sharing on the national level is to a certain degree also achieved in a few other countries on a voluntary basis, but remains incomplete. German Rail for example has agreements with many local and regional transport operators regarding data sharing and includes their timetable information in its HAFAS door-to-door information system. This voluntary data sharing is based on agreements, however, not all German public transport operators have such an agreement with German Rail. In Switzerland voluntary data sharing for passenger information systems occurs be-

tween SBB (Swiss Federal Railways) and local public transport operators. Furthermore the Federal Government is pushing an initiative to establish a national travel information system for public transport and the so-called “Langsamverkehr” (walking and cycling), which will contribute to a higher level of data sharing within the public transport sector.

Good examples of data sharing can be found quite often on a regional level across Europe (e.g. Germany, Italy, UK, Austria, Switzerland). The data shared provides passenger transport information together with information that enables revenue sharing. A few good examples are mentioned below.

In Germany for example, data sharing regarding passenger information and revenue sharing is common within regional transport associations, frequently supported by the authorities. Similar data sharing good practice at a regional level can be found in Italy, where many operators co-operate in STI (“Sistema Tariffario Integrato – STI”) schemes, including data exchange for passenger information and revenue sharing (details see Chapter 2.7 Ticketing/Fares, Booking/Payment).

In Belgium, data exchange between operators is common, including for the purpose of trip planning. However, it is difficult for researchers to obtain integral timetables and network data files from some operators.

A serious problem remains in terms of cross-border data sharing which seems to be quite limited. Cross-boarder good practice and co-operation is possible as with the TRANS BASEL project in the Basel region of Switzerland, France and Germany. This trial cross-border intermodal passenger information system achieved data sharing between many different stakeholders from different countries leading to a high quality passenger information system. The trial project was quite successful, but can not be updated any more due to a lack of funding (see also Chapter 2.6 Information). A well-developed border-crossing operation that gathers data from many fields is seen in the Öresund area of Denmark and Sweden, which has already been described in other Chapters (2.6, 2.7).

2.11.4 Overview and description of main factors of success

As with the case in many of the other categories, one of the principal factors of success appears to be the density of population. There is greater demand subsequently and a greater need for co-ordination and co-operation in metropolitan and urban areas.

Another factor of success is a clear structure of transport interchange ownership, possibly with the preference of management by an independent body.

With regard to cross-border co-operation, the fewer the number of (public or private) involved operators, the greater the likelihood of opportunities that provide successful measures.

A multitude of partners complicates the process of interchange management and consequently co-ordination, this leads to a segmentation of operative fields, lack of competition and inertia to find partners related to other modes, etc. On the other hand, it is also important that local operators are able to participate in interchange management.

The extension of the area is also a factor of success, as it has been proved that only if the area covered is the right size, it will be possible to create partnerships

and reach agreements. The bigger the region the harder it will be to progress the negotiations as more and more stake holders would be involved.

Policy consistency and close co-operation within the public sector is needed but not always sufficient. Better intermodal products and services as well as the creation of appropriated framework conditions by the authorities are key elements of success.

The private sector seems to show good examples of co-ordination and co-operation when win-win situations are created, such is the case for example with the AiRail services concept (Deutsche Lufthansa from Stuttgart and Cologne´s main rail stations to Frankfurt airport).

Data sharing

Factors of success include legal and regulatory frameworks that are set by the authorities to promote data exchange with aim to serve user needs, especially in the field of passenger information.

Working examples within the Netherlands and the Czech Republic show how such measures can operate, without causing unacceptable financial burdens for operators or the users.

Besides mandatory data provision, which seems to be the most efficient way to guarantee that operators co-operate in this field, voluntary co-operation seems to be possible where a win-win situation between different operators can be achieved; for example, when there is an understanding that they will benefit individually from the strengthening of passenger information systems in public transport. However, it needs strong key players to push such co-operation and a central point of responsibility for gathering the data and making it accessible for use by passenger information providers, planners, those responsible for fare integration or better network integration.

Some good practice examples show that a definition of a common electronic standard for data exchange contributes to the success of such activities. However, the technical integration of different data formats is no big issue, as innovative technologies that can integrate different formats are available.

2.11.5 Overview and description of main barriers

A wide range of financial, legal and institutional barriers exist with regard to this category. In several countries, including Germany, co-ordination and co-operation is regarded as a main barrier to the introduction of intermodal products and services, and there is clearly general lack of an administration to manage cross-border public transport.

In several countries, including Switzerland, sectoral thinking and hesitation regarding co-operation is prevalent. In other countries, including Germany, a barrier relates to few incentives offered by the government, whilst framework conditions such as opening of transport markets to competition and tendering, often present a further obstacle.

In some instances interchanges, are unmanned, and in the case of disruptions there is insufficient contact and sharing of information with passengers, as is the case at most Belgian interchanges. Incident management may be restricted to improvements in logistic organisation of personnel and rolling stock.

Data sharing

In most European Countries voluntary data-sharing is not common at all and is often fragmented, legal and regulatory frameworks that aim to gather and share data are missing. Consequently, it can be stated that the overall state of data sharing in European passenger transport is still rather poor.

There are good examples of voluntary data sharing for the use of compiling passenger information systems, however, this is not enough by far. Only in countries with a legal framework for data provision like the Czech Republic or the Netherlands, can we see a smooth operation of data sharing. Most countries however lack such a legal framework. Questions of who owns the data, who is responsible for its distribution and for what purpose it may be shared are frequent issues. The process is not regulated by the authorities in a way that favours the level of data exchange which is required in order to develop high quality intermodal services.

In many countries, operators and data owners are unwilling to share information. There is greater co-operation in terms of gathering time table information, however, there are much greater barriers in gathering information that allows ticketing co-operation and fare integration. Operators are unwilling to exchange such data, as the information is potentially commercially sensitive. This can be observed e.g. in the UK, in Sweden, Finland or Germany. The development of a more and more competitive public transport market is hindering the exchange of data. Legal and regulatory frameworks are not well developed to impede the negative effects of the free market (see also 2.6, 2.7).

At the same time one has to keep an eye on competition legislation which is designed to prevent anti-competitive behaviour of public transport operators in liberalised markets like the UK. In some cases anti-competitive behaviour is allowed if beneficial to passengers, depending on issues such as the market share of those operators making an agreement, but in some cases it may affect good intermodal co-operation. Regarding ticketing schemes it is stated in the UK that a ticketing scheme must not facilitate an information exchange between parties, except where this information is indispensable to the scheme and conducted in an open and transparent way. Competition laws have to be well designed to achieve a balance between fair competition and to encourage necessary co-operation that contributes to the whole public transport system.

Another important sector where co-operation regarding data sharing is lacking is border-crossing passenger transport. Not only are legal frameworks missing but interest in this field is not great from national authorities or operators.

2.11.6 Short category conclusions and recommendations

The research has found that in spite of the importance of co-operation and co-ordination of transport modes for the development of intermodality, the general situation is that there are no specific institutional guidelines to co-ordinate intermodal planning and operations and in most of the countries this does not seem to be a high priority. Lack of co-operation and lack of interchange management and common management of disruptions has often been identified as a major barrier in many countries. As far as cross-border co-operation is concerned, although there are some regions where there are traditional co-operation initiatives (Belgium, Germany, Luxemburg, Netherlands, France), much needs to be developed in order to improve co-operation and cross-boarder services.

It seems that there is a predominance of short-term commercial considerations against long-term vision that works against co-operation between operators.

In general, transport operators have different interests and structures in public transport and these are in part very heterogeneous. A major point of consensus is that countries with poorly integrated services need to realise partnerships and join efforts in order to contribute and development passenger intermodality.

Data sharing

The national inventories show clearly that in most European countries data sharing is a difficult and sometimes sensitive topic. There are only a few countries where a legal framework requires all operators to deliver their timetable and fare data to a central database that is used to provide integrated information (e.g. Czech Republic, Netherlands). An alternative to a central database would be to link a plurality of existing information systems through an open network to enable complete information for national (or international) travel chains, as in the German DELFI approach (cf. chapter 2.6 Information). Legal requirements regarding the participation in such a network are conceivable.

In most countries such a framework does not exist and only in a few cases of voluntary data sharing between institutions works well. Especially regarding the development of a liberalised passenger transport market data sharing topics become more sensitive as competitors - who often feel they own the data – are frequently unwilling to share certain information.

Many national inventories conclude that it is necessary to approach problems of data sharing by setting a legal and regulatory framework and to establish a central data base, or a linked network that integrates different information systems in one interface for public transport which would be co-ordinated (or supervised) by public authorities. An independent institution to gather data and to make it accessible seems to be a good way to deal with this issue and to guarantee free access to intermodal data. However, it has to be discussed critically what kind of data should be integrated into a central database or information network. Passenger information data regarding timetables seem to be rather uncritical, but data of other nature can be sensitive for operators in a competitive market and unwillingness to provide such data is understandable.

The protective tendencies of operators seem to increase amongst operators who deal with a liberalised transport market. However, co-operation regarding data-sharing is a must to achieve high quality intermodal passenger transport. Therefore e.g. the Finish Ministry of Transport and Communication (MTC), which usually prefers to support voluntary co-operation and is not in favour of forcing laws, would consider making rules for information collection from the different operators due to the importance of this field.

The European Commission could play a role in promoting border-crossing data exchange, to do so they would need to establish a European data base of public transport passenger information. This is however a difficult field due to the heterogeneous structures in the many different European Countries.

2.12 Promotion

2.12.1 Introduction

While it is essential to improve all parts of the transport chain it is also necessary to promote intermodality in a more stringent way. Techniques of awareness raising and mobility management can be used to influence travel behaviour in order to raise the share of intermodal trips. The following aspects are interesting to look upon in depth:

- The degree of awareness of intermodal travel options and consideration, the knowledge of direct and external costs in trip choice
- The poor understanding/perceptions by passenger of relative performance of each mode e.g. speed, congestion, delays, costs
- Direct marketing/education for intermodality for inter-city travel (analogous to regional/urban schemes)
- Role and usability of mobility centres and mobility management models in long-distance and international travel

2.12.2 State of the art

The promotional efforts towards passenger intermodality for intercity travel throughout Europe are very poor: 18 of 23 national experts consider the existing promotion in their country as rather hindering or a barrier. Only a minority of the national experts has given information about awareness raising and promotion campaigns towards passenger intermodality in their country. The overall conclusion is that campaigns focused at 'intermodality' are almost nonexistent nowadays. Indirectly however, intermodality is promoted in campaigns towards more sustainable mobility patterns (e.g. Car Free Days and Car Free Cities initiatives). Promoting long distance intermodal travel is also one of the core activities of the mobility centres and the number of these mobility centres is growing throughout Europe. In the tourist sector, here and there 'all in formula' are the promoters of long distance passenger intermodality. Although only few examples exist, almost all country experts recognise promotion and awareness raising as a priority action to enhance the realisation of passenger intermodality.

2.12.3 Selection and short description of good practices

Information and Promotion Campaigns

Promotion focused on intermodal travels is very rare. This is mentioned in only a few cases (e.g. Denmark, Finland, Austria). In general, promotion is focused on one mode.

Indirectly, yearly returning promotion days like 'In Town Without my Car' promote intermodality by showing people that alternatives to private car exist and are reliable. In Austria, several cities promote multimodal and integrated transport (eg. Linz and Vienna). But the focus is more on the local and regional transport and not so much long-distance.

In Finland, every four years the Ministry of Transport and Communication organises a campaign promoting public transport. Intermodality is usually one of the main points in this campaign.

Mobility Management for companies

There are only a few cases where companies have a legal obligation concerning mobility management. In Italy, all companies with more than 300 employees are obliged to have a mobility manager.

Mobility managers and mobility plans exist for companies in some of the study countries, but such measures are in their infancy and are not yet widely used; this is the case in Switzerland, Spain, Germany, Austria.

Mobility plans also exist in France (PDE, Plan Déplacement Entreprises). In the region Ile de France, this is promoted by a special service called EMIF (Company and Mobility in Ile de France), which gives advice on PDE's by assessing their quality of accessibility.

Within a company mobility plan, the commuting issues are the greatest priority, there is little or no attention paid to business travels. In Austria, sustainable business travel options (rail in long distance trips) became an interesting topic within mobility management for companies from the moment that the Federal environmental agency decided that the travel time could be reimbursed with money or leisure time (Herry et al.2000, p.37). From 2002 onwards, there is a programme offering government support to those companies who develop and implement measures to promote sustainable mobility for commuting and business travel.

Mobility centres

Several countries have mobility centres: Switzerland, Austria, Germany, Sweden, France, Portugal, Finland. The primary focus of these centres is general information on local trips, but they can also offer information about longer trips. According to a survey in the year 2000 amongst 35 mobility centres in Germany, more than 90 % offer information on long-distance rail, 48 % on airport accessibility and 37 % on car routing. In slightly less than half of the mobility centres, a ticket for long-distance train travel could be acquired (ILS 2002, p. 20-21). While this figure is somewhat higher now, long-distance travel is not the main focus. In general the main focus of mobility centres' relates to public transport, which of course is often used in intermodal travel chains. Between 70 % and 90 % of information requests at mobility centres concern public transport connections, there is no breakdown on how many of these requests related to intermodal transport and how many related to unimodal public transport.

A special case to mentioned is the Mobility centre in Antwerp (Belgium), established to prevent traffic jams during the road works on the ring way around the city. They organised campaigns, not only aim at the local population, but also within neighbouring countries. A similar promotional campaign to encourage greater passenger transport usage was conducted in Luxemburg. This campaign targeted drivers travelling along the motorway route between Luxemburg and Brussels, it informed individuals of disruptions due to road works and encouraged them to use public transport.

Other

Some countries refer to travel agencies, which offer services in planning and booking intermodal long distant trips (e.g. Lithuania). Tourist and recreational attractions often set up attractive combined tickets (passenger transport and entrance). These often refer to long distance trips; e.g. in Belgium we see co-operation between the National railways, the regional bus companies (De Lijn, TEC, MIVB) and more than 80 attractions spread over the Belgian territory.

2.12.4 Overview and description of main factors of success

The existing mobility centres are specialised in short distance trips in urban areas. It would be logical to link the short distance trip information with information about long distance trips. In some mobility centres, information about long distance trips can be obtained. These centres could also be a platform for the promotion of intermodal trips. Several countries which don't have mobility centres have a website where you can obtain information regarding intermodal trips.

Company mobility plans are not very successful as yet, but most countries realise that they can be important in reducing traffic problems in urban areas.

2.12.5 Overview and description of main barriers

The different systems of information and booking are a significant barrier for mobility centres. Also the competition between several levels of government and/or several companies is another significant barrier.

Another barrier is the lack of attention paid by the authorities on this subject. Sometimes, good opportunities are missed, e.g. in Athens. On days with a lot of air pollution, car access to the city is restricted, but these measures are not supported by measures to promote intermodality.

2.12.6 Short category conclusions and recommendations

Promotion in terms of intermodality is weak as little or no action has been undertaken until recently. But the concept of mobility centres does seem successful, though these centres are mainly focussed on urban trips. In all cases, authorities have been responsible for setting up and running such centres. The involved public transport companies don't take steps to organise intermodal information.

The mobility plans for companies have not been very successful to date. It has been difficult to convince companies to develop plans. The only way to do this systematically is by creating a legal framework.

2.13 Resources

2.13.1 Introduction

The following issues relate to the (financial and human) resource aspects of passenger intermodality.

Joint/mixed financing. Intermodal products and services confer benefits in a number of areas, including social benefits for authorities and commercial benefits for transport operators. At least some of the cost of investment and operations should therefore be divided between all beneficiaries, even if interchanges or information systems are operated by the private sector. A major problem related to this is that even when benefits of intermodal services can be assessed, it is hard to estimate what benefits accrue to which players and almost always this will lead to difficult negotiation of co-financing (e.g. if I as an urban transport authority invest in information at my interchange for long-distance travellers who do most of their travelling on a long-distance train, who gains most?)

Intermodal passenger information systems, especially those combining human interface and real-time road and public transport data are not usually commercially self-financing at this current time. This is a result of a low willingness to pay, the high cost of human interfaces and the need to merge disparate and non-standardised data sources. This presents a major challenge, either the public sector pays for it fully themselves, which is expensive and hard to justify, or many operators pay for it as a marketing partnership which may not be feasible in the competitive climate. Otherwise, the public sector and operators enter into a cost sharing private-public arrangement with a private sector provider, but this is very difficult to set-up and administer.

European and national funding structures and levers (compatibility with intermodality projects). Public funding structures rarely fit in practice with complicated multi-player, multimodal projects with long preparation, uncertain time lines and no simple categorisation of measures. European funding programmes in particular have almost no compatibility with door-to-door long-distance intermodal projects. Public funding structures often require clear-cut financially quantified cost-benefit arguments for funding approval. This is very difficult for intermodal projects, where benefits are generally smaller, more widely distributed, and harder to measure.

A lack of training and education in intermodality concepts. The concept of intermodality is relatively new and many experienced transport professionals are unaware of the complexities and implementation issues involved in building such systems. There is also very little capacity for solving the intermodal interface in institutions, which is a major barrier to progress.

2.13.2 State of the art

As far as qualitative information is concerned, the analysis reflects that many countries have had difficulties in implementing joint / mixed financing programmes. In countries like Latvia, there is no experience of joint financing of intermodality interchanges at all. Romania is only slightly better, however, the human resource training and education on passenger intermodality is a very poorly promoted topic. The financial and human resources available at the moment for the design of an acceptable level of passenger intermodality are insufficient if EU objectives are to be achieved. In the Slovak Republic there are several programmes providing financial assistance, however the general approach of national investment financing and cohesion measures, is a multimodal approach rather than softer measures and interchanges. The financing structure does not support the intermodal transport policy. The primary priority focuses on transport infrastructure and the creation of effective and good quality public transport systems.

Countries like Spain have benefited for many years through the European funding of longer distance transport schemes. These have indirectly improved the intermo-

dality situation in the country. In general, joint financing is still a problem. An indication of this are the discrepancies between national and regional governments on funding issues for the metro extension from Barajas airport to the new terminal. The human resources are, as in most of the European countries, not very widely looked after. Universities are starting to offer courses to raise public awareness and prepare professionals on the topic. And in Portugal, there are some experiences of partnerships between local and central governments for the purpose of constructing and extending interchange and transfer points, but these initiatives do not involve capital from private and public operators. There are no structures identified that share public and private co-financed schemes between operators and transport agencies and authorities.

The situation improves in Italy, where after the transfer of transport policy management from State to regional governments, many projects combining public and private resources have been planned. An example of this is the Gemona passenger intermodal terminal in northeast Italy. However, with regard to training and education, it is evident that there is a shortage of human resources with experience on intermodality issues. Institutions do not pay enough attention in providing educational opportunities. The situation is similar in Ireland as far as the implementation of intermodality projects is concerned, although Public Private Partnerships (PPP) have been used for a large number of projects in Ireland already, no PPPs have been used for interchange projects. However, there is a step forward in education, a website details PPPs across all sectors, from education to health and roads.

In Luxembourg, an example of good practice is a jointly financed programme by the Central government (Ministry of Transport and Ministry of Public Works) and the local government (Municipality of the City of Luxemburg) which in 2000 started a Modelling Cell. Other examples might be found in the Interreg IIA programme: Bitburg (D) – Luxemburg bus service (2002). In countries like Norway and Austria there are already joint financing programmes and projects such as the improvement of the rail connection to the Vienna airport.

In Switzerland budget is becoming more scarce. Although the federal Government realises the need to financially support intermodality measures, the issue of who pays/who benefits for this is usually a barrier for the implementation or maintenance of intermodal services. The Trans Basel system, which provides border crossing information, does not receive enough funding to keep the service up-to-date (see also section 2.6). The problem is a lack of real market for many intermodal products and services that are financially feasible from a network perspective.

Outside the European perspective, the situation in Japan is positive, subsidies are available for the improvement of intermodality, the costs of the projects are shared by the local governments, road authorities and railway companies. An example of this is the Shinkansen line project recently introduced in Yamagata. The scheme was executed through the establishment of a tertiary sector venture by the JR East railway company (private), the local financing facility in Yamagata Prefecture, the City of Yamagata, and local businesses.

Three issues relate to the subject of resources and its favouring/hindering effect towards passenger intermodality. The national experts have been asked to provide a general assessment of these issues (see the list in the table below)[22]. For this

[22] The expert assessments of the status of intermodality in Latvia and Malta are missing.

category, there is generally a fairly even split of opinion with regard to the three issues covered, although it has been classified "difficult to say" in 3-6 countries.

Expert assessment on following issues .	(rather) factor of success	(rather) a barrier	difficult to say
1. Joint and/or mixed financing of products and services investments	8	16	3
2. European and national funding structures and levers	15	7	5
3. Training and education in intermodality concepts	8	13	6

With regard to joint/mixed financing of intermodality product/services investments, the majority considers this to be either a hindrance (11 countries) or barrier (5 countries) to the achievement of passenger intermodality. It is however considered a success by Norway, Finland, Luxembourg, Estonia and Bulgaria, and a facilitator in Ireland, Belgium, Italy and Slovenia.

The feedback in relation to European and national funding structures and levers is far more positive, with five of the countries (Ireland, Norway, Finland, Estonia and Bulgaria) stating that it is a success and a further 11 rating it as a facilitator. It is considered a barrier in just one country (Greece) and a hindrance in a further six countries.

The picture with regard to training and education in intermodality concepts is fairly mixed, although overall it's more negative than positive. It is considered a barrier in five countries and a hindrance in a further eight. However it is stated a factor of success in Estonia and Bulgaria and a facilitator in the seven further countries: Hungary, the Netherlands, Italy, Luxembourg, Lithuania, Romania and Slovenia.

2.13.3 Selection and short description of good practices

Experience with respect to joint financing of inter-changes and transfer points

In Austria, the new airport rail terminal at Vienna Airport is jointly financed by the national government (65 %) and the airport (35 %).

The encouragement of private finance in major transport schemes has been a feature of the UK transport policy since 1992. The system of Private Finance Initiatives (PFI) and Public Private Partnerships (PPP) consist of strictly defined legal contracts for involving private companies in the provision of public services. Such arrangements are currently in place for the operation of London Underground, whereby the responsibility for the infrastructure (lines, tunnels, signalling and stations) is in private hands. A PFI is also planned for the proposed Phase 3 extension of the Manchester Metrolink light rail system. In some cases, intermodal schemes are funded 100 % privately such as the Heathrow Express rail link to central London; this project was funded entirely by the private British Airports Authority (BAA).

In Japan, subsidies exist for transport node and terminal improvements. The cost of these projects is generally split between local government, road authorities and railway companies, following a consultation exercise. Subsidy that is specifically directed towards multimodal transport systems, is used to strengthen links between terminals (e.g. airports and ports) and the road or rail network.

Leverage opportunities of EU- and national funding programmes

In order to optimise intermodality in France, the national government provided support up until 2003. The most recent support specifically targeted station interchange, park and ride, and ticketing. However, a political change in the government resulted in the measure being abandoned in 2003.

Manchester Airport interchange in the UK received funding from various public and private sources, including the EU's Trans-European Network Schemes programme. European funding towards transport schemes can also be obtained in those areas receiving EU structural funds. For example, in the South Yorkshire Objective 1 area, financial support was obtained towards better interchange facilities at Sheffield rail station.

Human resources and institutions; training and education

In Finland, local authorities in addition to transport operators are responsible for intermodality training. Also within the Ministry of Transport and Communications contains a steering group with the purpose of preparing guidelines.

Spain generally has a poor level of passenger intermodality awareness amongst professional and relevant actors in the transport sector. However, the national ministry responsible for transport has established a national training observatory for road transport. The aim is to assist with developing measures contained within the Action Plan for the Transport of Bus Passengers, which does includes some measures that will ultimately improve intermodality.

2.13.4 Overview and description of main factors of success

One of the key factors of success in attraction and use of finances is the need for a project initiator and manager, since a large range of actors are normally involved in transport schemes. There is also a need for shared agreement and responsibility of some form.

Another factor in the attraction of funding support is the ability to demonstrate clearly the costs and benefits of a measure or project, through the completion of a comprehensive cost-benefit analysis.

2.13.5 Overview and description of main barriers

Opportunities for joint funding are often complicated due to the complex nature of public transport funding in several countries. The general organisation often involves several funding mechanisms and programmes, and rigid sectoral based funding structures. Furthermore, funding is sometimes only available on a monomodal basis.

It is clear from some countries, including Germany, that most intermodal products and services in long-distance travel chains are not profitable if considered in isolation, which is often a barrier for implementation. They need to be viewed as part of a network, which often does not happen. Joint financing of projects seems possible where a win-win situation between all operators can be created in a free-market environment.

The issue of who pays for intermodal measures and who benefits can be an important barrier in realising or maintenance of a scheme. This includes conflicts between

national and regional governments, as was the case with respect to co-financing a small extension of the Madrid metro system to a new terminal at Barajas Airport.

A different barrier exists in the Czech Republic, where cheap loan financing depends on state guarantees (which is not likely to be granted since it has to be approved by parliament) or the municipality requires a good credit rating. This results in funds only being made available in the Prague area. Furthermore, the possibility of attracting private sector funds for infrastructure projects is dependent on the investor having an adequate legal framework to fall back on, which is not the case in the Czech Republic.

Experience in Denmark has found that the continued joint financing of projects is threatened by financial problems amongst institutions or important institutional changes to them, for example, privatisation. Certain projects have been terminated as a result of financial problems in relation to organisational changes.

Experience in Germany has demonstrated that a barrier to increased investment in intermodal products, from the point of view of the private sector, is that there is a lack of cost-benefit analysis for such measures. Key players including Lufthansa and German Rail are often hesitant to get involved in projects for this reason.

An issue in the Slovak Republic is that the approach of national investment financing in addition to the parallel (EU) structural and cohesion fund measures is a multimodal corridor approach rather than intermodal door-to-door, with a focus on hard corridor infrastructure rather than softer measures and interchanges.

A barrier identified in Romania is the poor process of identifying alternative funding sources for projects.

Finally, competition between transport operators is identified as a barrier to measures contributing to the improvement of passenger intermodality. In Switzerland for example, Zurich Airport, which was a precursor for a good intermodal connection between air and public transport (rail and bus), is now questioning investments in public transport since some European air competitors do not invest an equal amount of money in public transport improvements which is an economic disadvantage for Zurich Airport.

2.13.6 Short category conclusions and recommendations

An approach of joint public-private funding of interchanges and transfer points has been adopted in many European countries, together with European and national funding opportunities.

However, key barriers identified include: the restriction of funding sources to single modes; the need for a win-win situation in an increasingly free market environment containing a large number of stakeholders with different priorities; a focus on the assessment of costs of benefits on individual elements of the transport network rather than a chain; and, the issues relating to the availability and management of funds in some of the new European member states.

In some of the newer EU member states, where the current infrastructure cannot meet the challenges of European requirements, the expectations from the international financial institutions and initiatives – EIB, EBRD and the Stability Pact 1 – are that they will contribute to interchange development.

According to the German experts, the joint financing schemes can only be feasible if a win-win situation between the different operators is created in a market environment. The implementation of schemes at major airport hubs seem to be more appropriate locations for investment. A more robust analysis of benefits and costs involved in the implementation of passenger intermodality measures would be crucial to overcome some of the barriers (risk assessment) that hinder the investment in services and improvements.

It is also advisable, as suggested by the French experts, to establish a real project initiator, without which the project cannot be achieved. It is also observed that intermodality financing needs to share resources among a large number of parties, which requires a long time as well.

In the Danish case, it is also pinpointed that organisational changes can also affect the continuation of jointly financed projects.

Lithuanian experts express the need to solve the input to supply and the profit / division / allocation problems to allow companies to invest on passenger intermodality schemes. It is also thought that the absence of methodological materials, real investigation data, and scientific research results, prevent deeper studies on the issue of combined services.

In Portugal it is believed that the creation of joint financing partnerships would require the set up of companies whose partners would be the different participating agents. Their aim would be the promotion, construction and management of projects and the joint sharing of incomes and operational costs.

In Romania, experts recommend the centralisation of financial resources which would be co-ordinated by the Ministry of Transport. For example, so that national funds can be managed based on their relationships with the urban and metropolitan transport authorities. Financial resources should be managed based on partnerships between local authorities and concessionaires of the transport services, thus being able to invest in real time information systems and intermodal terminals.

In Switzerland it is suggested that competition between transport operators, even at the international level, is to be looked at when dealing with joint financing, as this can lead into a reduction of investments in measures that contribute to better intermodal passenger transport.

2.14 Technical issues

2.14.1 Introduction

Few countries have national standards for the design and layout of interchanges, information systems and ticketing systems and there are still only a few European standards prepared and in progress addressing these issues. One of the problems is that standardisation activities cannot keep up with the fast development of policy and technical solutions that can be applied. Many standards that have been developed or that are being developed seem to miss an integrative concept. Key underlying technical standards such as an intermodal traveller data dictionary and traveller data exchange, with open interfaces for intermodal data including road data, are still missing.

This endangers the potential of certain solutions that could contribute substantially to the improvement of intermodal travel chains (e.g. smart cards), because many of these technologies are currently developing in different directions in different European countries and regions.

2.14.2 State of the art

The following analysis describes the situation in terms of the standardisation of the user interface of intermodal travel, information, management and payment data bases.

There are varying degrees of standards for the layout and design of interchanges within Europe. Some are comprehensive national standards providing guidance for the detailed design of public transport infrastructure from the location of interchanges, terminals and stops, to ticketing and telematics. Other countries have little or no guidance. To date there is no recognised international or world standard or co-ordinated set of standards in place and different countries still produce their own guidance.

Many regions or cities are working on the standardisation and integration of telematic applications providing information and ticketing systems, in particular smart cards. Guidance and standardisation work undertaken by CEN is helping to develop similar systems, however, interoperable systems are heavily dependant on technology developed by manufacturers and those technologies adopted by different countries/regions. A number of countries have highlighted that they work closely with a number of European Standardisation documents and activities under CEN TC 278 and ISO TC 204. In addition Japan is involved with ISO TC 204.

Denmark, Greece, Hungary, Malta, Estonia, Slovenia, Romania and Poland highlighted that they had no standardisation of the user interface of intermodal travel, of information, of management and payment data-bases.

Technological Standardisation & Potential Cost Reduction

The Belgian report highlights that it is evident that great costs occur due to the lack of standardisation. Belgium has intensive links with France, Germany and the Netherlands making the country very susceptible to the negative cost effects of the lack of standardisation. A worst case scenario would be; Belgium rolling stock having to be interoperable with 3 or 4 sets of characteristics, signalling systems would need to guarantee accessibility of 3 or 4 types of trains and ticketing systems would need to read 3 or 4 types of smart cards.

The topic of standardisation is recognised in its importance for intermodal transport chains in Germany. Transport operators realise that standardisation activities may help to save costs for new systems, for example for electronic fare management (EFM), as development costs are shared and interoperability creates business opportunities for participating operators (lower barriers for clients to access public transit).

2.14.3 Selection and short description of good practices

Information & Ticketing Technologies

Many of the countries within Europe have rail ticketing and travel information systems providing the traveller with information and a ticket to travel using a number of different rail companies. A number of countries such as Sweden (Resplus) also provide bus and rail information and tickets (Banverket/ITS Sweden, 2003). There are also examples such as in Italy where information on parking facilities adjacent public transport interchanges are presented along side public transport information.

Bus stations in Sheffield and Leeds (Great Britain) have smart and clean waiting facilities, with electronic passenger information systems (Real Time Information), travel enquiry centres, retail outlets and security arrangements.

In Luxemburg, the *Electronic Transpas E-go* is being tested. The goal is to achieve an integrated ticketing, validating, access system for the whole country. The system operates with a smart card, without printer, without touch, just by holding nearby the registering machine (source: http://www.e-go.lu). The question is whether the system can be introduced in an international context and as an intermodal system: using a car-sharing car, rent a bike, park and ride etc.

In Italy, the 5T system in Turin; 5T (*Telematic Technologies for Transportation and Traffic in Turin*) is a multi-scope project (funded by EC), in which one of the aims is to develop a so-called "tool for purchasing mobility", by which users can pay Public Transportation fares, parking for cars or can enter the Limited Traffic Zones, by a special magnetic card (Ministero delle Infrastrutture e dei Trasporti 2004, p.33).

There has also been the development of non contact smart cards in a number of countries. These include Portugal, the UK and Luxemburg. However, to date the smart card operation is limited to city areas rather than having a longer distance application.

The German Kernapplikation system offers an open concept which enables the continued use of older chip card systems (like the Bremer Card), but also enables the introduction of innovative contact-less systems. The VDV (Association of German Transport Undertakings), is a key player in the development of the Kernapplikation, in the context of EFM is not talking about Smart cards, which is often used as name for such systems in other sources on this topic, but sees the new systems as a "customer media".

There are also those who feel that the smart card concept as a product of the nineties and the cell phone as a more adequate product for the twenty-first century. This was highlighted in the Germany Country Report. Cell phones may be used applying different concepts for ticketing and passenger information (SMS, WAP, check-in and check-out call etc.). Europass (ticket) in Strasbourg is a good example of cross border integration. This card allows any travel within urban network of Strasbourg and Kehl and Offenburg in Germany. It allows as well travels in regional trains in both countries. Trampoline in North of France provides specific fares for cross border regional train between France and Belgium. Interoperability issues between different countries are important and often a problem between many regions.

Translink in Northern Ireland takes their information system to a truly fully integrated level with a multimodal journey planner, from local bus stations through the national

rail network to another local bus station. This system does not integrate with services beyond Northern Ireland (i.e. the Republic of Ireland).

Interoperability of Tram/Train Technologies

In France, train and metro interoperability is poor. Metros run the most often with rubber tyres and not with steel wheels. Several French cities have got a light rail (or tramway) system. Most of the schemes are with steel wheels but interoperability with train tracks is not yet possible. A major future development concerns this point with the emergence of the tram-train system like in Germany. One system is in use on the cross border section Saarbrücken (D) – Saarlouis (F). The first French scheme will be in operation in 2006 in Paris suburb. A similar scheme was scheduled in Mulhouse the same year but it will probably be opened in 2007 or 2008. Major conurbations like Lille and Lyon (most advanced studies) but also Rouen or Strasbourg are also thinking about tram-train to use the railways for urban public transport.

Clearing & Fare Management

Germany has developed an organisational frame for a nation-wide interoperable electronic fare management (EFM) system. A large number of transport operators have already signed a letter of intent to use the system. The system is called Kernapplikation ("the core").

The Kernapplikation is a comprehensive approach which does not standardise the hardware but defines for example the organisation of data, the functions of EFM systems, the system architecture, the ticket-media interface and pays attention to a comprehensive security system. This approach makes the system independent of tariff structures, that may be quite different among German regions, and independent of different hardware used. Easy communication between different transport operators is enabled. The approach has reached a good consensus, also in cooperation with European partners and found interest in North America as well. The German work is closely linked to the activities of the European Standardisation activities in CEN TC 278 "Road Transport Traffic Telematics" WG3 "Public Transport" SG5 "Interoperable Fare Management Architecture" and to future work in ISO TC 204 "Intelligent Transport Systems" WG8 "Public Transport and Emergency Services".

Other Technical Solutions

Switzerland has an expert commission for Transport Telematics Standardisation named FK 9, which is affiliated to the Association of Swiss Road and Transport experts. This commission is working on Swiss standards, and accompanies Standardisation activities on European and International level. This includes telematic applications that relate to intermodal passenger transport. The expert commission has the possibility to assign research projects in the area of transport telematics applications (TA Swiss and ASTRA, 2003).

2.14.4 Overview and description of main factors of success

In Karlsruhe, Germany, urban trams can run on the same railway lines as those used for regional train services, linking the city centre with the outlying region. In this case the compatibility between heavy and light rail, using special units that can deal with different power systems, enables the a direct journey from surrounding areas into the city centre without the previously needed change at the main railway

station that is located outside the city centre (cf. KVV 2004). The so-called Karlsruher Modell has been quite successful and found use in other cities as well.

2.14.5 Overview and description of main barriers

Many cities and regions are developing and adopting telematic applications providing information and ticketing systems, in particular smart cards. Guidance and standardisation work undertaken by CEN is helping to develop similar systems, however, interoperable systems are heavily dependant on technology developed by manufacturers and those technologies adopted by different projects.

In the Netherlands, the strippenkaart has had its time and a smart card is perceived to be the future. However, the card would gather a large amount of data including travel patterns, which give rise to concerns regarding privacy.

In Germany, the costs of new systems for electronic fare management (EFM) are considerably high. Within one Verkehrsverbund (regional public transport associations), there may occur costs within the hundreds of million Euro range. For Germany as a whole this would mean costs within the range of billions of Euro. In times of tight financial resources this may be a main obstacle for the introduction of such systems.

It is stated within the French report that the main barrier/challenge faced is the good distribution of fare revenues between transport operators and regions.

In France, high speed train (TGV) can go on classical electrified railways but the contrary is impossible because of signalling issues: low-speed trains need signals on tracks whereas high speed railways communicate directly with the train's driver. And of course, slow trains (140 km/h) can hardly run between fast ones (300 km/h). Signalling and also electrification or security standards are the main issues of the lack of international trains interoperability.

Many neighbouring countries share the same gage tracks but not all, one example is Finland which has a different track gauge to Norway and Sweden. However, where countries share the same gage there are often many other problems such as the technical interoperability of rail power units, signalling systems or simply platform heights. For example, in terms of power units the French run under 25 Kv voltage – in some parts under 1.5 Kv, Germany 15 Kv, Netherlands 1.5 Kv and Belgian 3 Kv. In some cases the power units have to be changed at the border and/ or personal have to be changed. Often, personal have to be specially trained for trains that cross the border. It is thought in Germany that complete technical interoperability will at the earliest be realised in 30 years (Walther, G., 2004).

A convenient and integrated ticketing with through connections and information in several languages is still missing on cross border journeys between many countries throughout Europe. For example in Romania, travel information is only in the Romanian language, which is an effective barrier for tourism and business trips.

Trans-Basel is a door-to-door European intermodal cross-border information trial system including road transport which works in the Basel region in Switzerland, France and Germany. It is a research project and had 600 users per day at its peak. At least 20 % of users have changed behaviour based on information, but few are willing to pay the full production cost of such complex information. There were many difficulties of data integration due to non-standard and unavailable sources. Re-

cently funding for the project has stopped, the system is still online but cannot be kept up to date completely any more (Trans Basel Consortium 2004).

The kombirail project in Norway aimed to use the railway tracks for trams because of congestion on the road network in the centre of Oslo. Unfortunately the capacity on the rail network is used by the trains. The project was therefore stopped but if a new double track railway is built then this project will be considered again.

There are some examples of the inter-operability of different rolling stock along train lines in the UK. There are some short sections of light rail/heavy rail line, however, HMRI (Her Majesty's Railway Inspectorate) has expressed significant concerns over safety of operation of such lines.

Barriers can be summarised as follows:

- Privacy issues regarding smart cards
- Interoperability of rail and tram infrastructure between countries (track gage, power units, signalling systems etc.)
- Lack of information in different languages in some countries
- Upkeep of data input of non standardised data into information systems
- Safety concerns over mixing heavy and light rail on the same tracks, also capacity issues on rail infrastructure
- Funding.

2.14.6 Short category conclusions and recommendations

Smart Cards, contact or non contact are being developed in a number of countries. There are some attempts to standardise these systems across Europe, however, the picture drawn from these reports is that technology or systems are being developed separately and there is no evidence that the systems are compatible. Further information and discussion is required regarding the potential use of mobile phones for ticket and payment purposes.

In terms of rail and tram infrastructure and technologies, approaches need to be sought on ways of standardising infrastructure. This is required not only between neighbouring countries but also on a pan European basis.

The following points summarise the recommendations for this section:

- Assign an expert commission to resolve ticketing, information, fare management and infrastructure interoperability
- Explore mobile phone technology and potential as an adversary to the smart card
- Combine research within Europe on smart card technology and develop a standard system that can be manufactured and installed throughout Europe
- Develop a framework for standardising transport information databases throughout Europe and providing a standard interface for European wide multimodal door-to-door travel information
- Europe wide law on language provision at interchanges and public transport information
- Develop the interoperability of key rail routes though Europe providing standards and technical solutions to that can be implemented throughout Europe

- Introduce measures that encourage the sharing of technical solutions
- Funding & testing innovative business models.

3. Conclusions

This report highlights the situation regarding 14 clusters or categories of issues about passenger intermodality from 29 countries. About 1000 pages of national material have been analysed. The result is a portrait of the status of intermodality throughout Europe and a selection of the most interesting national, regional and local practices regarding passenger intermodality issues (good as well as bad ones) together with an overview of the most important barriers and factors of success. This section provides a brief summary of the main findings.

3.1 With respect to the context related issues

The knowledge of the market for passenger intermodality in long distance trips is generally rather poor.

The national inventory revealed that knowledge about the market for passenger intermodality in long distance trips, its potential, strengths and weaknesses is poor. Only a few countries can present well documented market studies. There continue to be countries that do not even arrange basic information on the passenger transport market; e.g. data on the modal split are missing in most of the Eastern European states. An overall picture of the transport market based on regular analysis of national travel patterns is however crucial to steer and plan transport investments from an intermodal demand perspective. In countries that do have good data on modal split by means of national surveys, we see that the long distance traveller is often not considered an important market segment to focus on, with the exception of some larger European countries and in tourism trips. Little is known about the combined use of different modes (trip chains) in long distance trips and the market segments for intermodality. At this moment, each transport operator studies his own (unimodal) market, the knowledge about needs and requirements of passengers on the combined use of modes is missing. Our ageing society stresses the need for greater attention towards improving accessibility at interchanges and information. For this particular market segment, tourist trips are the main focus.

Little national research and evidence exist regarding the (possible) impacts of investments in passenger intermodality.

In some countries cost-benefit studies are made on a project basis but not for integrated networks. Important barriers are the absence of an overall tradition of cost-benefit analyses in transportation investments, the lack of crucial data on the market for intermodality and the multi stakeholder nature of these types of investments. At this moment in time, there are no monitoring indicators available to assess intermodality products and services. Some countries have developed a manual or guidelines on impact assessment but these are not widely used.

Most of the countries lack a national or a regional intermodality strategy. The political will is growing in many countries, however implementation is still too early and continues to be lacking.

Generally no specific passenger intermodal strategy is in place at the national or regional level, and similarly no single institution is responsible for the co-ordinating role of long-distance intermodal transport. However in recent transport policy docu-

ments in several countries, the topic of intermodality gains more importance. At this moment, the highest political support for intermodality tends to be concentrated in metropolitan and larger urban areas, with dense passenger transport networks and a high percentage of passenger transport use where environmental problems and problems of congestion are more stringent.

In the new member states of the European Union the will for passenger intermodality is generally even less evident. Rather, attention and priorities are more focused on: the availability of transport funding, the lack of or the poor quality of existing infrastructure, the rigidity of current public transport management and operation (especially, the need to open up the market), a lack of information relating to travel patterns and needs, and increased travel demands associated with economic growth and neighbouring countries.

Conflicts between stakeholders and policy inconsistencies often relate to funding issues between different levels of government.

Key players generally include the national government along with principal transport operators, especially national rail and air.

The research has suggested that clear support for passenger intermodality at the national government level, backed up by clear integrated transport policies and strategies are initial prerequisites for improvements in the passenger intermodal sector. Furthermore, the establishment of a key independent organisation responsible for undertaking research, promotion, and for leading concepts is strongly recommended, especially in the context of an increasingly liberalised and disaggregated transport network.

Existing legal and regulatory frameworks are generally not suited to enhance intermodality in a context of decentralised and liberalised transport markets

The national inventory revealed that currently there are currently no laws or regulations in place across Europe that treat intermodality as a central issue. Nevertheless, some legal frameworks for individual transport modes do indirectly seek to improve intermodal travel characteristics in some countries.

Moreover, there are only a few legal frameworks in place to co-ordinate competition models for longer distance journeys. This is in spite of the increasing requirements for co-ordination resulting from the opening of the transport sector to competition.

Although it is generally the case that specific legal sticks to intermodality do not exist, these appear to be increasing with the privatisation of bus and rail operators. In general, agreements on prices between firms are not allowed according to the competition laws.

In many of the new member states of the European Union, the focus of transport development is still on improvements to basic infrastructure, and consequently laws and regulations have not yet been prepared to cover intermodality.

3.2 Regarding intermodality products and services

Integration of networks and interoperability is weakest in cross border travel.

Regarding the level of *integration of networks and their interoperability***,** a key issues that has arisen from many countries is the subject of international borders and cross-border travel. In many instances around Europe it is currently easier to travel from one side of a country to the other than simply get on a train and travel to a proximate city over the border. It has been stated on numerous occasions that regional cross-border travel should no longer be considered as international travel. Cross border transport is a weak point in countries with otherwise strong internal public transport networks, such as Switzerland and the Netherlands. Several stakeholders including public institutions, local authorities and operators need to be responsible for improving cross boarder transport and this requires diligent co-operation.

In most of the countries good progress is made regarding the general quality of interchanges. However the situation remains very heterogeneous.

Experience regarding the *design and layout of interchanges* varies throughout Europe. The planning and location of interchanges is identified as one of the most important issues for success together with safe, secure and short transfers between points of interchange. Vice versa poor planning and location of interchanges with poor transfers is seen as a barrier to intermodality. The following 7 key issues were gathered from the analysis of the national inventories: (1) logistics – locating the interchange in the center of a city, with access to all modes of transport, (2) interoperability between modes needs to exist; (3) passenger friendliness – provide up-to-date travel information; provide safe and clean waiting facilities; ensure that the layout of the interchange is easy to understand for visitors; (4) security – users need to perceive that the interchange is a safe place to be, not just for them but also for their bicycles and other equipment; (5) Finance – substantial investment is needed in order to ensure that interchanges reach a high standard; (6) a document is needed that provides guidance on the planning, locating and design for interchanges including the provision of transfer between interchanges; (7) a standard is needed for travel information, safety, accessibility and other facilities at interchanges including the removal of language barriers.

Public and political support, co-operation and co-ordination between operators and providers and a regulatory and legal framework are crucial factors for the development of better integrated transport services and time tables

There are varying levels of integration of transport services and timetables throughout Europe. Good practices can be seen in a number of countries such as France, Denmark and Switzerland. Other countries exhibit good planning and intentions but poor time keeping of services actually disrupts integration. Many other countries have very little planning and/or integration. Furthermore, integration is made difficult in many countries as a result of competitive practices.

Greater co-operation and co-ordination between transport operators and providers is required, particularly in a deregulated or less regulated environments, to facilitate the development of better integrated services. Although co-operation between competing companies seems difficult to achieve, it is a prerequisite to a fully integrated transport network. A co-ompetition (co-operation and competition) is possible in

certain market environments if a win-win situation can be created, e.g. AiRail serves as an example to other fields. A regulatory and legal framework is needed to give incentives for co-operation. Concepts in this field are widely missing, research in this field would prove to be very important.

In countries such as Great Britain and Spain, it has been suggested that the establishment of forums are needed in order to appropriately consider and help facilitate longer distance internal trips, as opposed to local and regional trips that are presently considered by local transport authorities. More centralised countries such as France and Japan have developed fast and efficient national rail networks.

It is also important to note that the will of the country and the importance of public transport to its people is extremely important in terms of funding and implementing public transport improvements including the integration of services.

Providing high quality passenger Information has evolved from a technological challenge towards an organisational challenge.

The technology needed to provide high-quality passenger information systems is already widely available. A group of forerunner countries prove that organisational issues can also be solved and such systems can thereafter be implemented. However, it also becomes clear that within Europe the status of passenger information systems is very heterogeneous and in large parts still unsatisfactory, especially if border crossing elements are included in the trip chain. The intermodal long distance traveller still faces many problems when trying to obtain integrated total-cost information for his trip or information regarding disruptions.

The strategy of the UK Government, that aims at a one-stop-approach that not only includes passenger information but also ticketing, seems to be the right direction.

Co-operation of authorities and operators, in particular with regard to border-crossings, and topics of financing are key aspects where action is needed.

The question of how to finance high quality passenger information systems needs to be given much greater attention. As mentioned before, standard methods of cost-benefit assessment are still widely lacking but are the key to establishing such systems. The question of public funding and the sharing of costs amongst operators are equally important, as there seems to be a low willingness of users to pay for information systems.

In many problem fields it is possible to learn from examples of good practice. Some institutions have taken the lead and brought key players together and as a result they have achieved high-quality information services.

Much work remains to be done to achieve an intermodal, door-to-door, total-cost information system on a national or even European level, but many innovative ideas have been successfully realised in certain places and are possible elsewhere.

Truly intermodal tariff and ticketing systems are still widely missing, although there are a few good examples. The main obstacles in the field of tariff/ /ticketing systems and booking/payment services are organisational, not technical ones.

The status of ticketing, fare integration, booking and payment systems is very heterogeneous within Europe. Some forerunner countries like the Netherlands, Den-

mark, Belgium or Germany already provide a relatively high quality regarding these aspects, although they are far from being perfect. When aiming at a system that is user friendly for the European intermodal long-distance traveller a lot of work remains. Many of the good practices can be found on the regional and urban level, but may be transferable to the long-distance dimension. However, especially in many Eastern and Southern European Countries ticketing systems, fare integration, booking and payment can be characterised as antiquated, lacking totally behind to what is already common standard in many other countries. Those countries will have to make considerable efforts to reach a decent status of only unimodal regional systems, whereas forerunner countries can make the further step towards real intermodal and nationally (or even European) integrated systems, using innovative technologies.

Particularly weak is the European integration of ticketing and fare systems. There are many good examples of available technical solutions that could solve this problem, but organisation especially where border-crossing issues are concerned, is a challenging task.

Many of the national country reports recommend to establish door-to-door through ticketing on a national and European level. The introduction of smart card systems is seen as a way of promoting such an integration, and to solve difficult problems like revenue sharing. However, costs are considerable, and some experts warn against focusing too much on expensive smart card systems. Alternatives like the use of booking and ticketing by normal cell phones, should be evaluated. Reliable cost/ benefit studies are a must to evaluate such concepts. Furthermore the use of highly developed technological concepts by vulnerable groups like elderly or impaired people have also to be evaluated, as many people are not able or fear to use these technologies.

Standardisation activities are mentioned as an important element of promoting innovative technologies. Particularly because of the high investments that are already made in e.g. smart card systems in the Netherlands or on regional and urban level, standardisation must be sped up if the chance for a European integration of such systems should not be missed.

Another important field which requires action is the opening of transport markets to competition, which may lead to more heterogeneous ticketing and fare systems as well as booking and payment procedures, which may pose a severe barrier for the intermodal passenger. Concepts how to design regulatory and legal frameworks to handle this problems are still missing in most countries. The hope for better services for the passenger by creating more competition may be foiled by heterogeneous structures in important fields like fare integration.

In some country reports the promotion of innovative concepts among passengers have been mentioned as recommendations. Indeed many good solutions that are available could be used much more, if potential clients knew of them. Much of the time the focus of projects is to implement innovations on the technical side and not enough attention is paid to the promotion needed so that passengers feel encouraged to really try them.

Finally what has been included in many country reports and is worth mentioning was the recommendation to have generally low prices for public transport in place, as the best fare integration and ticketing system is useless if high public transport prices, especially for the occasional user, discourage the use of public transport. This is also the case for many border-crossing connections.

In most countries, the responsibility to carry baggage remains solely with the passenger.

The analysis has shown that truly integrated baggage services are widely missing across Europe. In most cases the passenger is responsible for the transport of his/her baggage which leads to inconvenience and poses a barrier to intermodality. Good practises have mainly been identified in the area of door-to-door transport and in air-rail co-operation, mainly in the central European countries.

For door-to-door transport the demand has been declining with the market penetration of rolling baggage. Current offers are often expensive. It needs to be seen how an attractive service can be offered that meets the expectations of the passenger with regard to value for money.

A further integration of the air and rail mode is necessary. Due to the high investment a check-in at the rail station is only possible in larger markets. Nevertheless this service can be expanded especially with regard to the city access of airports by rail. A more advanced integration with code sharing and integrated baggage handling to replace short flights only seems feasible for larger hubs (where competition for slots is high).

In the near future, the majority of passengers will still transport baggage on their own. To improve their situation, especially with regard to the use of rail as a main mode for intermodal journeys, a better accessibility of stations and enlarged space for baggage on trains are the main factors that need to be advanced.

In any case modal thinking has to be overcome, which is true for most of the issues described in this report. For baggage handling, co-operation of different operators is necessary. All good practise examples show that this is a primary condition to be met. This is relevant for both organisational matters (logistics) and financial matters (joint financing).

Security questions have to be answered for all integrated baggage handling schemes.

The few examples of highly integrated products and services[23] can be found in the combination air-rail, in the field of mobility packages or in the tourism sector.

There are currently only a few truly intermodal products and services that are highly integrated. These initiatives are at the forefront of what is possible in intermodal passenger transport. However, such concepts seem to be limited at the moment to countries with highly developed passenger transport systems. Even in such an environment the realisation of innovative solutions that require the involvement of many stakeholders and considerable investment are facing complex challenges. Questions of financial feasibility, the lack of cost/ benefit studies in many fields and uncertainties regarding the user behaviour are problems to be mentioned in this context. Uncertainties and risks seem to be high for many of the involved stakeholders and large key players frequently hesitate to implement innovations if the risk in-

[23] Highly integrated services/products include different transport modes or complementary services and require co-operation of different stakeholders, often using innovative technologies.

volved can not be calculated. Successful co-operations require usually a win-win situation and also a will to be an innovator in an unknown field.

A concept like the German AiRail is widely discussed in the context of passenger intermodality but it should not be seen as a solution that is transferable to many other fields or places. Such a concept can only work for major hubs as described above.

“Mobility packages” seem to be more universal, but questions of financing smart card systems and complex organisational matters may severe as obstacles, especially when implementation is considered on the national and European level.

Cost benefit studies providing a detailed evaluation of innovative highly integrated concepts in passenger intermodality seem to be necessary to reduce risks and create a decision base for operators and authorities.

For the AiRail concept the application of the system, also in long-distance transport, may be feasible for major European hubs (e.g. Paris, London), which should be further evaluated by research projects. The “City Access” type of air rail services already available in Vienna or London may be feasible for many larger airports, however, this also requires further analysis.

In the field of “mobility packages”, the standardisation of activities regarding smart card or other systems seem to be necessary; especially when aiming at a national or European scale of introduction. The transfer of best practice may also serve to spread ideas and the experiences of innovators.

Regarding the aforementioned tour packages in the tourist industry, which are already available, and linked to the idea of “mobility packages”, the idea of introducing “mobility providers” could be further developed. The concept of competing “mobility providers” that buy mobility services (rail, car sharing, rental cars, leasing cars, public transport, rental bike, taxi etc.) from the transport operators and sell them to the clients, maybe as an intermodal package, is discussed for example in Germany as one way of promoting intermodal transport chains, as clients would be able to get their mobility out of one hand. Competing mobility providers would have a real interest to offer their clients the most attractive mobility combinations. However, there are doubts if such a mobility provider service would be financially feasible. Nevertheless it is worth to further investigate such ideas.

3.3 Regarding planning and implementation

User needs assessments and intermodal transport network planning are no common practices in Europe.

User needs assessments in planning intermodality products and services are not common practice. At this moment, monitoring of user needs and satisfaction is still undertaken on a sectoral level; each operator (rail, bus, ..) measures the needs and satisfaction of their own customers and is not very inclined to share this (confidential) information in order to help make a case for and to justify new intermodal investments. A solution could be the investment, by national governments, into high quality data collection on user perception, needs and satisfaction. This requires a good knowledge of the market for intermodality (see section 2.1). The results and methods developed in national research programs should be compared and fine-

tuned. The existing practices on user needs assessments for interchanges, info systems etc. should be collected and benchmarked. A standardised European monitoring system could be of help.

The biggest challenge in terms of intermodal network planning is the co-operation between the several transport providers and operators and also between the several levels of local, regional and government authority. Firstly, it is important that the national, regional and local authorities agree on the concept of the network and the potential for intermodality. Secondly, they should create a platform to help the private companies with intermodality. The companies themselves are not inclined to stimulate intermodality because this needs investment, which doesn't seem very profitable at first glance.

Co-operation and co-ordination is the main factor of success for realising passenger intermodality. At the same time it is considered the main barrier.

In spite of the importance of co-operation and co-ordination of transport modes for the development of intermodality (expressed several places so far), the general situation is that there are no specific institutional guidelines to co-ordinate intermodal planning and operation; and in most of the countries this does not seem to be a high priority. Lack of co-operation and lack of interchange management and common management of disruptions has often been identified as a major barrier in many countries. As far as cross-border issues are concerned, although there are some regions where there are traditional co-operation initiatives, much needs to be done to improve co-operation and cross-boarder services.

It seems that there is a predominance of short-term commercial considerations against long-term vision that works against co-operation between operators.

In general, transport operators have different interests and structures in public transport and these are in part very heterogeneous. A major point of consensus is that countries with poorly integrated services need to realise partnerships and join efforts in order to contribute and development passenger intermodality.

The national inventories show clearly that in most European countries data sharing is a difficult and sometimes sensitive topic. Many national inventories conclude that it is necessary to approach problems of data sharing by setting a legal and regulatory framework and to establish a central data base, or a linked network that integrates different information systems in one interface for public transport which would be co-ordinated (or supervised) by public authorities. An independent institution to gather data and to make it accessible seems to be a good way to deal with this issue and to guarantee free access to intermodal data. However, it has to be discussed critically what kind of data should be integrated into a central database or information network. Passenger information data regarding timetables seem to be rather uncritical, but data of other nature can be sensitive for operators in a competitive market and unwillingness to provide such data is understandable.

Awareness raising and promotion of passenger intermodality in long distance trips is rather an empty field throughout Europe

Only a minority of the national experts have given information about awareness raising and promotional campaigns towards passenger intermodality. The overall conclusion is that campaigns focused on 'intermodality' are largely nonexistent. Indirectly however, intermodality is often promoted within campaigns that aim to en-

courage more sustainable mobility patterns (e.g. Car Free Days and Car Free Cities initiatives).

The concept of mobility centres does seem successful, though these centres are mainly focussed on urban trips. However, promoting long distance intermodal travel is a core activity of a mobility centre and their numbers are growing throughout Europe.

In the tourist sector, there is an 'all in formula' which promotes long distance passenger intermodality.

Opportunities for joint financing of intermodality investments are often complicated.

An approach of joint public-private funding of interchanges and transfer points has been adopted in many European countries, together with European and national funding opportunities.

A key barrier is often the restriction of funding sources to a single mode. Moreover in several countries opportunities for joint funding are complicated due to the complex nature of public transport funding. There are often several funding mechanisms and programmes, together with rigid sectoral based funding structures.

Some crucial success factors in attracting and the use of finances is the need for a project initiator and manager, since a large range of actors are normally involved in transport schemes. There is also a need for shared agreement and responsibility of some form. Another factor in the attraction of funding support is the ability to demonstrate clearly the costs and benefits of a measure or project, through the completion of a comprehensive cost-benefit analysis. At last, there is a need for a win-win situation between all operators in an increasingly free market environment.

There is a strong need for standardisation of technologies used in intermodality products and services.

Smart Cards, contact or non contact, are being developed in a number of countries. There are some attempts to standardise these systems across Europe. However, the picture drawn from these reports is that technology or systems are being developed separately and there is no evidence that the systems are compatible. Further information and discussion is required regarding the potential use of mobile phones for ticket and payment purposes.

In terms of rail and tram infrastructure and technologies, approaches need to be sought on ways of standardising infrastructure. This is required not only between neighbouring countries but also on a pan European basis.

4. Recommendations

To conclude this report, it is necessary to determine fields on which to focus in the following proposals phase of the study. Those fields should be within the scope of action for the European Commission. Many of the recommendations made by the national experts aim at initiatives and concepts that are feasible for national governments or local authorities rather than for the European Commission. The EU has only limited scope to systematically influence national and urban systems unless they are directly related to the principle of European cohesion or as a condition of financing of measures related to social policy. Consequently, fields of action that open realistic possibilities for improving the situation in terms of long distance intermodal passenger transport in Europe have to be identified.

In the first report of this study that deals with the “Analysis of the Key Issues for Intermodality” (ILS/Babtie/LV/ETT 2004) certain priorities from the perspective of EU influence have already been identified and possible fields of action have been listed. Now, with the results of the national inventories these action fields can be verified and filled with greater detail. They will provide guidance in the proposals phase of the study that will elaborate and set out practical recommendations and promising proposals for further study.

It has to be stressed at this point, that the national inventories showed a very heterogeneous status of passenger intermodality throughout Europe. Forerunner countries have already quite advanced passenger transport markets, many intermodal products and services are evolving and the topic is considered to be important whereas other countries mainly deal with conventional problems like the achievement of a decent public transport infrastructure and service. Due to the scope of different problems and potentials, it is difficult to give general recommendations on how to improve passenger intermodality throughout Europe. It is realistic to assume that passenger intermodality will develop with different speeds and qualities in different European regions for many years to come. Where possible, concrete action should take into consideration individual problems and potentials by looking at each country case by case.

It has to be stressed that during the interviews for the national inventories, many experts mentioned that the “last urban mile” is an essential element of a long distance passenger transport chain and should not be neglected. It has even been mentioned that limited resources in some cases are better directed towards the urban and regional level, as this could have more impact on long-distance intermodality than expensive measures that focus solely on the long-distance dimension.

Keeping this in mind, general fields of intervention for the European Commission in the context of the analysis from the national inventories could be to:

1. publish a Commission communication to introduce a framework concept for passenger intermodality.

   In light of the general poor status of intermodal long-distance passenger transport in Europe, this seems to be a necessary first step. The national inventories indicated that many fields require action at a European level as national interests are low and a lobby for such issues is missing. Border crossing transport for example lacks national lobbies and further European standardisation activi-

ties and integration of information, ticketing and payment systems also need support from the European level.

2. introduce directives or regulations that ensure European co-operation.

   The national inventories indicate clearly that a lack of co-operation between operators and authorities and among operators themselves is a main barrier for the implementation of high quality intermodal passenger products and services. It seems necessary to establish regulatory and legal frameworks to give incentives for co-operation or to force it where necessary. One example is the field of data sharing which normally does not work smoothly on a voluntary basis.

   Comments from many countries throughout Europe highlight that the opening of passenger transport markets to competition may be developing a major obstacle to co-operation; this would certainly impede voluntary co-operation especially among competing operators. Fields of passenger information, ticketing or timetable co-ordination may be affected seriously in a competitive environment and new barriers for intermodal long-distance passengers may develop. Accordingly, the European Commission should evaluate the degree to which regulatory and legal frameworks can handle problems related to the opening of the transport market to competition.

3. support or finance European intermodality products and services.

   This is a wide field, with much potential for European action. However, it has to be aimed at supporting the development of European intermodality products and services that may have a real impact on long-distance passenger intermodality and are financially feasible in the long run. From the national inventories the following fields have been mentioned that are considered to be of high importance for intermodal passenger transport and require support at the European level:

   - The establishment of a one-stop-approach on information and ticketing systems at a national and European level is recommended. This would include the establishment of door-to-door intermodal passenger information systems and door-to-door through ticketing (EU-Spirit could be first base for such an approach).

   - In terms of ticketing, it is recommended by many national experts to support the introduction of a common European system for electronic ticketing, e.g. in form of a smart card system. However, it is also recommended not to focus solely on expensive smart card applications but also to evaluate alternatives that are financially easier to realise (e.g. mobile phone technology).

   - The promotion of improvements to rail baggage handling for passengers is recommended, e.g. accessibility of stations and enlargement of space for baggage on trains and integrated baggage handling (e.g. in air rail integration).

   - The support of integrated air rail services is recommended; by evaluating which major European airports are appropriate for such integration, in particular connection by long-distance rail (e.g. the German AiRail concept seems limited to major hubs) and issues relating to the “last urban mile” (“city feeder” type connections e.g. CAT Vienna).

- The promotion of innovative intermodal concepts and services among passengers needs support. National inventories frequently show that existing products and services are not very well known but have potential to be well accepted.

4. introduce and support intermodality co-ordinating organisations.

   The national inventories frequently showed that good intermodal practice could evolve where intermodality is pushed by a key player or a lobby. Co-ordinating organisations can play a key role in promoting passenger intermodality. National experts recommended to:

   - establish a European platform that deals with cross-border co-operation and integration of services, research and good practice in the field of passenger intermodality. Cross-border issues in particular lack a lobby at a national level and therefore require European co-ordination. The support to establish trans-national forums in these fields could be one of the tasks of such a European initiative. An initiative also needs to be established that promotes better Trans-European data sharing, perhaps through an independent institution as a base for European passenger information and ticketing systems.

5. use financing programmes to fund intermodality measures of significance for cohesion, and use financing levers on other programmes to ensure intermodality compliance.

   - The field of border-crossing passenger transport requires particular attention; even forerunner countries have not yet developed comprehensive strategies. This field is important in terms of cohesion and requires further support.

   - It is necessary to review funding sources that restrict expenditure to a single transport mode.

   - Funding and testing of innovative business models is lacking, there may be a useful approach to promoting passenger intermodality.

6. finance and organise standardisation activities.

   Standardisation activities are of high importance for many fields relating to passenger intermodality. From the European perspective it has to be considered a high priority to establish European standards. Failure to do so would result in heterogeneous implementations of intermodal innovations (e.g. smart card systems) throughout Europe which may evolve as a severe obstacle for European integration.

   - Standardisation activities at a European level regarding electronic ticketing, booking and payment systems. In this context the integrative possibilities of e.g smart card and other systems, as intermodal “mobility packages” (also for long distance travellers), have to be kept in mind.

   - Standardisation activities related to the design and layout of interchanges have been mentioned in some national inventories as a recommended field of action. Signage at interchanges for example is lacking and poses a barrier especially for the international long distance traveller. European standardisation activities to provide general comprehensible and self-explaining signage

and other elements of interchanges (e.g. removal of language barriers) are recommended.

7. finance research and studies

   Passenger intermodality remains a field with many open questions, these questions often present barriers for the implementation of innovations in this field. Research and studies may provide essential information on such topics. Some fields that require support are as follows:

   - Research that provides better knowledge about the market in Europe, on intermodal passenger transport, is necessary to fill some gaps. Target groups of intermodal products and services and the market potential of such concepts have to be identified more clearly (e.g. potentially transfer the approach of the INVERMO research project – see Ch. 2.1.3 - to the European level).

   - As mentioned above, regulatory and legal frameworks to promote intermodal passenger transport (e.g. through data-sharing, ticketing co-operation) are highly important. Concepts and strategies regarding this topic still seem to be missing in most countries and research to provide guidance seems necessary.

   - Cost-benefit studies regarding intermodal products and services are widely missing. Better knowledge in this field is necessary to remove uncertainties for operators and other key players that are willing to implement such concepts. Also the willingness of users to pay for certain intermodal products and services and other ways of ongoing financing have to be better evaluated (e.g. field of information systems). Impact assessment methods regarding intermodal products and services have to be developed.

   - Research is required to investigate how innovative technologies and concepts are accepted and used by vulnerable groups like the elderly and impaired people to avoid the exclusion of these travellers.

   - Innovative organisational concepts as the one of “mobility providers” (see Chapter 2.9) should be evaluated regarding their potential.

8. make policy recommendations

   Policy recommendations may be made in many fields related to intermodal passenger transport. They should focus on activating potential for intermodal products and services on the European, national, regional and local level. Policy recommendations may aim towards the creation of responsible institutions or departments (e.g. in national ministries) that would have a genuine interest in pushing the topic of intermodal passenger transport, as it was shown that main obstacles are organisational ones and it needs key players that feel responsible and bring various stakeholders together in a complex network. Other policy recommendations could refer to the opening of passenger transport markets to competition and ways to deal with negative impacts in fields that are of importance for passenger intermodality.

9. provide and help set up professional training programmes and exchange best practice.

The national inventories highlight a lot of good practice and knowledge on how to promote passenger intermodality. This information is available throughout Europe but is often not easily accessible. The development of Europe wide guidance and good practice was recommended by the national experts; for example on good interchanges and facilities (e.g. location, design, transfer), passenger information, impact assessments, and innovative intermodal products and services (e.g. mobility packages, treintaxi, car sharing in combination with public transport).

The aforementioned recommendations that were developed from the national inventories cover a wide range of topics. These recommendations need to be further evaluated in the proposals phase of the study, which areas should and can be fields of European intervention. For this purpose, a workshop with a small group of experts on passenger intermodality and a following larger scale expert validation in written form will be held to provide an in depth analysis and focus on the most important questions.

Towards Passenger Intermodality in the EU

Annex

Annex to Report 2
Expert Assessments, Subcontractors, National Experts and Bibliography

for the
EUROPEAN COMMISSION
DG ENERGY AND TRANSPORT
Unit G 3
Motorways of the Sea and Intermodality

Dortmund, October 2004

Table of Contents

1 EXPERT ASSESSMENT OF THE STATUS OF PASSENGER INTERMODALITY

Within the national inventories, there has been asked a more personal assessment from the authors (consortium partners and subcontractors) of the country reports. These assessments support the thematic analysis as they give a better understanding of some key issues.

However, as it is a personal assessment from different experts and from different countries it is impossible to use this information as a complete quantitative measuring of the status of passenger intermodality. Nevertheless, in this annex we present the main conclusions from this assessment as one of the sources of information.

The assessment is based on answers from the national experts on following questions:

1. How would you judge the following issues in terms of being either a barrier or factor for success in the country? [1]

1: a factor of success for the realisation of passenger intermodality
2: as rather facilitating passenger intermodality
3: as rather hindering passenger intermodality
4: as a barrier for the realisation of passenger intermodality
5: it is difficult to say

(table see next page)

[1] In the overall assessment, Latvia and Malta are not included.

factors of failure and success	rather facilitating/factor of success	rather hindering/barrier	Difficult to say
Frequencies of scores …	1 and 2	3 and 4	5
1. cat1: data availability and knowledge of the market	7	18	2
2. cat3: political will and lobby for intermodality	15	12	0
3. cat3: national/regional policies/priorities w.r.t.intermodality	15	12	0
4. cat3: policy consistency	11	14	2
5. cat4: impact of competition models	3	17	7
6. cat4: institutional aspects of data sharing	5	18	4
7. cat4: institutional aspects with regard to co-operation	10	15	2
8. cat10: taking into account user needs assessment	9	11	7
9. cat10: network approach to planning	15	11	1
10. cat11: co-operation subsidized & commercial transport	7	14	6
11. cat11: co-operation between operators and authorities	13	13	1
12. cat11: cross border co-operation	10	12	5
13. cat11: interchange management	9	12	6
14. cat 11: management of disruptions	4	18	5
15. cat 12: promotion of intermodality for intercity travel	5	18	4
16. cat 13: joint/mixed financing of products/services investments	8	16	3
17. cat13: European and national funding structures and levers	15	7	5
18. cat13: Training and education in intermodality concepts	8	13	6
19. cat14: standardization	9	11	7
20. cat14: interfaces to integrate existing products and services	10	9	8
21. cat14: technical aspects of data exchange	10	9	8

2. Key issues: How important are they for the realization of intermodality in your country?[2]

1: important
2: rather important
3: rather unimportant
4: unimportant
5: it is difficult to say

(table see next page)

[2] In the overall assessment, Latvia and Malta are not included.

Priorities for the realization of intermodality	(rather) important	(rather) unimportant	difficult to say
Frequencies of scores...	1 and 2	3 and 4	5
1. cat1: data availability and knowledge of the market	26	-	1
2. cat3: political will and lobby for intermodality	27	-	0
3. cat3: national/regional policies/priorities w.r.t. intermodality	26	1	0
4. cat3: policy consistency	26	-	1
5. cat4: impact of competition models	20	4	3
6. cat4: institutional aspects of data sharing	18	8	1
7. cat4: institutional aspects with regard to co-operation	26	1	0
8. cat10: taking into account user needs assessment	25	2	0
9. cat10: network approach to planning	26	1	0
10. cat11: co-operation between subsidized &commercial transport	21	3	3
11. cat11: co-operation between operators & authorities	26	1	0
12. cat11: cross border co-operation	22	4	1
13. cat11: interchange management	23	2	2
14. cat 11: management of disruptions	23	2	2
15. cat 12: promotion of intermodality for intercity travel	25	2	0
16. cat 13: joint/mixed financing of products/services investments	25	1	1
17. cat13: European and national funding structures and levers	25	2	0
18. cat13: Training and education in intermodality concepts	25	1	1
19. cat14: standardization	20	3	4
20. cat14: interfaces to integrate existing products and services	23	2	2
21. cat14: technical aspects of data exchange	19	7	1

2. SUBCONTRACTORS

2.1 SUBCONTRACTORS TO ILS

TetraPlan A/S, Copenhagen, Denmark

National Inventories for Denmark, Sweden, Finland and Norway

The Institute of Behavioural Sciences (IBS), Tokyo, Japan

National Inventory for Japan

2.2 SUBCONTRACTORS TO BABTIE

Sofia Technical University (STU), Bulgaria

National Inventory for Bulgaria

Georg Ots FIE, Tallinn, Estonia

National Inventories for Estonia and Latvia

Budapest Technical University (BTU),
Department of Highway and Railway Engineering, Budapest, Hungary

National Inventory for Hungary

Vilnius Gediminas Technical University (VGTU),
Daiva Girskeviciene, Vilnius, Lithuania

National Inventory for Lithuania

Suchorzewski Konsulting, Warsaw, Poland

National Inventory for Poland

Romanian Union of Public Transport (URTP), Bucharest, Romania

National Inventory for Romania

University of Maribor FG Maribor, Slovenia

National Inventory for Slovenia

2.3 SUBCONTRACTORS TO LANGZAAM VERKEER

Centre d'Etudes techniques de l'Equipement (CETE), division Aménagement Construction Transports,
Le Grand-Quevilly, France

National Inventory for France

2.4 SUBCONTRACTORS TO ETT

Foundation of Research and Technologie Hellas (FORTH),
Heraklion, Greece

National Inventory for Greece

TECNIC Consulting Engineers S.p.A., Rome, Italy

National Inventory for Italy

Perform Energia, Dafundo, Portugal

National Inventory for Portugal

3. LIST OF COUNTRY EXPERTS INTERVIEWED

3.1 AUSTRIA

List of experts interviewed

- **Dr. Andreas Dorda**
  Federal Ministry for Transport, Innovation and Technology
  Bundesministerium für Verkehr, Innovation und Technologie (BMVIT)
  Vienna
- **Dr. Gerhard Platzer**
  IPE – Integrated Planning and Development of Regional Transport-systems
  IPE – Integrierte Planung und Entwicklung regionaler Transport-systeme
  Ges.m.b.H.
  Vienna
- **Wolfgang Rauh**
  VCÖ – Mobility Association Austria
  Verkehrsclub Österreich
  Vienna
- **Werner Reiterlehner**
  State of Styria
  Amt der Steiermärkischen Landesreigierung
  Fachabteilung 18A Gesamtverkehr und Projektierung
  Graz

3.2 BELGIUM

List of experts interviewed

- De Lijn: **Marc Nuytemans**: Strategy, Dept. Manager
  Guy Van den Bril: Development technology solutions
- **Cor Dierckx**
  Flemish Government, Ministry of Mobility
  Advisor of the Cabinet of the Minister of Mobility
- **Henry Maillard**
  Federal Government, Ministry of Mobility
  Manager Dept. Mobility studies
- NMBS: **D.Leclercq**, Dept. Manager, Dept. Passenger Transport
  Leo Pardon: Director Dept. Passenger Transport
  Anita Rombauts: Strategy manager, Dept. Passenger Transport
  Hugo Van Herle: Dept. Manager, Dept. Passenger Transport
- **Andy Steels**
  Ministry of the Flemish Region, Dept. Environment and Infrastructure
  Advisor on the Dept. Public Transport and Airports

- **Bart van Camp**
  Beheersmaatschappij Antwerpen Mobiel: information manager
- **Bond van Trein,**
  BTTB: Tram-en Busgebruikers: PT users group

3.3 BULGARIA

List of experts interviewed

- **Alexandre Alexandrov**
  Pacific Consults International Project "Port Bourgas" BG-P4 DPM
- **Miglena Alexandrova**
  Senior Marketing Manager, Sofia Airport
- **Natasha Antova**
  Manager “Wasstels”
- **Kalina Atanassova**
  General manager “VURMAN” LTD
- **Angel Batakliev**
  President, Bulgarian Autotransport Union
- **Boryana Dineva**
  General manager “TRINITY INTERNATIONAL” LTD
- **Jivko Jelev**
  M.Sc., PhD – Executive Director, National Transport Institute, Sofia
- **Marius Kolev**
  Deputy Director of пътническо бюро “Рила”
- **Vassilka Pankovska**
  Manager, Alma tour
- **Prof. Rayko Raykov**
  M.Sc., Ph.D – Higher Transport School, Sofia
- **Gueorgy Savov**
  Manager, RTS Ltd – Sofia (Rail Transport and Spedition)
- **Vassil Vassilev**
  General manager “TRINITY Counsult” LTD

3.4 DENMARK

List of experts interviewed/mailed

- **Jens Peter Bach**
  Transport Ministry

- **Jan Gabrielsen**
  Transport Ministry
- **Hans Ege Jørgensen**
  HUR – The Greater Copenhagen Authority
- **Jørgen Skielbo**
  HUR – The Greater Copenhagen Authority

3.5 ESTONIA

List of experts interviewed

- **Tõnis Laks**
  Ministry of Economic Affairs and Communications – ISPA and Transport Development and Logistics Department
- **Toomas Leetõe**
  Ministry of Economic Affairs and Communications – Head of Development and Cooperation Division, Transport Development and Logistics Department
- **Tarvi Viks**
  IRU member ERAA – International Passenger Transportation

3.6 FINLAND

List of experts interviewed

- **P. Jalasto**
  Ministry of Transport and Communications, Helsinki

3.7 FRANCE

List of experts interviewed

- **Hervé Anveroin**
  Transpole, Reponsable Intermodalité/ Commerces
- **Valérie Attas**
  Transpole, Responsable Services et Développement
- **Réginald Babin**
  GART, responsible of Transport System Department
- **Olivier Paul Dubois Taine**
  Ministry of Transport, Direction of International and Economics Affairs, Mission of intermodality
- **Dominique Plancke**
  Regional counsellor of Nord Pas de Calais

3.8 GERMANY

List of experts interviewed

- **Silke Ahrens, Hans Peter Moeller**
  DB Fernverkehr AG (German Rail, long distance transport)
  Leiterin Services Reisekette/ Intermodalität (P.TVS 2), (Intermodal passenger transport - long distance)
- **Prof. Kay W. Axhausen**
  Eidgenössische Technische Hochschule Zürich
  Institut für Verkehrsplanung und Verkehrssysteme (Institut for transport planning and transport systems)
- **Prof. Dr.-Ing.Manfred Boltze**
  ZIV Darmstadt
  Geschäftsführung (director) und wissenschaftliche Leitung (scientific head)
  ZIV (Zentrum für Integrierte Verkehrssysteme, Center for integrated transport systems)
  also Professor at the University of Darmstadt, Fachgebiet Verkehrsplanung und Verkehrstechnik (Department of transport planning and transport technology)
- **Hans Fakiner**
  Fraport AG
  Beauftragter für Intermodalität (Commissioner for intermodality of Frankfurt Airport, also deals with the AiRail concept) Fraport AG
- **Mr Niels Hartwig**
  Bundesministerium für Verkehr, Bau- und Wohnungswesen
  Federal Ministry of Transport, Construction and Housing
- **Tilmann Heuser**
  BUND, Bund für Natur- und Umweltschutz Deutschland (NGO, Association for the protection of the nature and environment Germany)
  Referat für Mobilitätspolitik (Department Mobility Policy)
- **Prof. Dr. Andreas Knie**
  DB Rent (German Rail Rent)
  to be reached at „CHOICE mobility providers“
- **Jörg Last**
  Universität Karlsruhe (TH), (Technical University of Karlsruhe)
  Institut für Verkehrswesen, (Department for transport planning)
- **Berthold Radermacher**
  Association of German Transport Undertakings, VDV
  Head of Standardization, Research Coordination, and Industrial Contacts Section

3.9 GREAT BRITAIN

List of experts interviewed

- **David Copley**
  Babtie Group
- **Phil Moore**
  Newham Borough Council
- **Richard Porter**
  Heathrow Express Operations
- **Max Thomson**
  City of Edinburgh Council
- **Paul Townsend**
  Babtie Group
- **George Watson**
  Elan Public Transport Consultancy (PLUSBUS)
- **Jonathan Young**
  Scottish Executive

3.10 GREECE

List of experts interviewed

- **Alexander S. Deloukas**
  New Funding Sources Investigation Manager, Attiko Metro SA
- **Panagiotis Kontogiannis**
  General Director, Athens Urban Transport Organisation
- **Argiris Mamais**
  Head, Transport Planning, Athens International Airport Eleftherios Venizelos
- **Nikolaos Spanos**
  Commercial Direction, Passenger Service Manager, Hellenic Railways Organization S.A.

3.11 HUNGARY

List of experts interviewed

- **Dr. János Berényi**
  TRANSORG Ltd, Director, expert of logistics
- **Dr. Ildikó Marcsa**
  VOLÁN UNION, Director of Coach Transport, experience in passenger transport planning

- **Dr. Csaba Orosz**
  Regional Research Centre, Director, Budapest University of Technology and Economics, Faculty of civil engineering, Department of Highway and Railway Engineering, Associate Professor

3.12 IRELAND

List of experts interviewed

- **Martin Darcy**
  Republic of Ireland Department for Transport
- **Professor Hugh Finley**
  Trinity College Dublin
- **Patricia McAllister**
  Centre for Cross-Border Studies
- **Alex Robertson and Alaistair Christie**
  Babtie Group, Dublin

3.13 ITALY

List of experts interviewed

- **Dr. Giampaolo Basoli**
  General Directorate European Programs, Ministry of Infrastructure and Transportation, Rome
- **Dr. Maria Antionetta Del Boccio**
  TAV - Direzione Infrastruttura Sistema AV, Rome
- **Dr. Mauro Diez**
  Air Terminals Infrastructure Department, Civil Aviation National Body - ENAV, Rome
- **Avv. Pierluigi Di Palma**
  General Directorate, Assistance to Aviation National Body - ENAC, Rome
- **Dr. Mario Goliani**
  International Projects and New Links, Rete Ferroviaria Italiana - RFI, Rome

3.14 JAPAN

List of experts interviewed

- **Ito Makoto**
  Managing Director, Institute for Transport Policy Studies, Japan

3.15 LATVIA

List of experts interviewed

- **Indra Gromule**
  Ministry of Economic Affairs and Communications

3.16 LITHUANIA

List of experts interviewed

- **Zigmantas Balcytis**
  Minister of Transport and Communications of the Lithuanian Republic
- **Vitalijus Bertasius**
  Deputy Director of Economy, Municipality enterprise “Communication service”
- **Prof. dr. Marija Burinskiene**
  Head of Urban Engineering department, Faculty of Environmental Engineering, Vilnius Gediminas Technical University
- **Prof. dr. Jonas Butkevicius**
  Transport Management Department, Faculty of Transport Enginering, Vilnius Gediminas Technical University
- **Stasys Dailidka**
  Director of Passenger Transport Department, JSC “Lithuanian Railways”
- **Vitalis Dudys**
  Senior Fleet Development and Charter Flights Manager, JSC “Lithuanian Airlines”
- **Ass.prof. dr.Algirdas Griskevicius**
  Transport Management Department, Faculty of Transport Enginering, Vilnius Gediminas Technical University
- **Andrius Jerzemskis**
  Commercial Director, JCS “TOKS” Vilnius Distant Passenger Transport (bus) Company
- **Alminas Maciulis**
  State secretary of the Ministry of Transport and Communications
- **Rolandas Mazaliauskas**
  Head of Passenger transport Department, State Road Transport Inspectorate under Ministry of Transport and Communications of the Republic of Lithuania
- **Petras Mikalonis**
  Chief Specialist of Roads and Road Transport Department, Ministry of Transport and Communications of the Republic of Lithuania
- **Prof. Habil. Dr. Ramunas Palsaitis**
  Head of Transport Management Department, Faculty of Transport Enginering, Vilnius Gediminas Technical University

3.17 LUXEMBOURG

List of experts interviewed

- **Juttel Tom**
  Ingénieur diplomé en Génie civil Proje “mobilitèit.lu”
  Ministère des Transports Luxembourg

3.18 MALTA

List of experts contacted by e-mail:

- **Maria Attard**
  Malta Transport Authority ADT
  Awtorita' dwar it-Trasport ta' Malta
  Manager, Transport Policy, Planning, Programming and Statistics
  Transport Strategy Directorate
- **Ministry for Transport and Communications**
  EU Affairs, Directorate
  Director: **Anton Spiteri**, Dip. Mgt.

3.19 THE NETHERLANDS

List of experts interviewed

- **C.D. van Goeverden,**
  Researcher, Dept. of Transport and Mobility, TU-Delft
- **Prof. Dr. T. Muller**
  Civil Technology, Dept. of Transport and Mobility TU-Delft
- **Prof. J. Proper**
  National College for Tourism and Transport studies, Breda
- **F. Savelberg**
  Program supervisor, Department Passenger Transport, Directorate-General of Transport and Water Management, Transport Research Centre (AVV) , Rotterdam
- **F. Twiss**
  Department consumer affairs, ANWB, The Hague

3.20 NORWAY

List of experts interviewed/mailed

- **Thor K.Haatveit,**
  Head of Department, Ministry of Transport, e-mail communication
- **Harald Minken,**
  Economist, Institute of Transport Economics (TØI), e-mail communication
- **Gesa Isabella Rudolph,**
  Head of Section, Oslo municipality, e-mail communication
- **Ivar Sørlie,**
  Director of Transport, Oslo Municipality, personal communication

3.21 POLAND

List of experts interviewed

- **Anna Lenarczyk**
  Director, PKP Przewozy Regionalne Sp. Z o.o., Warsaw
- **Anna Rosik**
  Marketing Specialist, PKP Intercity Sp. Z o.o., Warsaw
- **Marta Wasowska**
  PKP Intercity Sp. Z o.o. Warsaw
- **Marek Witkowski**
  Director, PKP Przewozy Regionalne Sp. Z o.o., Warsaw
- **Olgierd Wyszomirski**
  Director, Public Transport Authority, Gdynia
- **Andrzej Zurkowski**
  President, PKP Intercity Sp. Z o.o., Warsaw

3.22 PORTUGAL

List of experts interviewed

- **António Pérez Babo**
  Private consultant in the area of Urbanism, Transports and Mobility and Guest Assistant Teacher at the Faculdade de Engenharia da Universidade do Porto (Engineering School of the University of Porto)
- **Manuel Boavida**
  Councilor of the Higher Council of Public Works, Transportation and Housing (Advisory Board of the Minister)

- **Carlos Manuel Dias Miguel**
  Specialist in the area of Transports and Mobility and Teacher at the Instituto Superior de Transportes (High Institute for Transports)
- **Costa Vieira**
  Manuel, Advisor to the Director General for Surface Transportation, Ministry of Public Works, Transportation and Housing

3.23 ROMANIA

List of experts interviewed

- **Marian Bratu**
  RATB, Head of the Exploitation Department
- **conf. dr. eng. Vasile Dragu**
  U.P.B. Faculty of Transports
- **Dorin Dumitrescu**
  ITS ROMANIA, General Manager
- **dr. eng. Doina Olaru**
  Perth University, Australia
- **conf. dr. eng. Gabriela Popa**
  U.P.B. Faculty of Transports
- **Florin Popescu**
  S.C. METROREX S.A. Bucharest, Head of the Commercial Department
- **prof. dr. eng. Şerban Raicu**
  Pro-rector U.P.B. (Polytechnical University of Bucharest)
- **Liviu Şoavă**
  S.C. METROREX S.A. Bucharest, Technical Department
- **Gabriela Zamfir**
  R.A.T.B., Head of the Operation Office

3.24 SLOVAK REPUBLIC

List of experts interviewed

- **Jan Cura**
  Director of Inprop s.r.o, Slovak Republic, Zilina

3.25 SLOVENIA

List of experts interviewed

- **Mr.Godec**
  Slovenian Railways
- **Mr. Kotar**
  Managing director Passenger Terminal in Ljubljana
- **Ministry of Transport**
  (**Mr. Živec, Mr. Vezjak, Mr.Peternel** - Buerau for Traffic Policy, Sector for Road Public Transport)
- **Ministry of Transport**
  Directorate for Roads (responsible for Regular Bus-Service – **Mr. Blaž, Mr. Bele**)
- **Mr. Pipan**
  Chamber of Craft
- **Mr. Plevnik**
  Urbanistični Institute Ljubljana (Leading institute for conceptual regional planning - Intermodal knots)
- **Mrs. Zatler**
  Chamber of Commerce

3.26 SWEDEN

List of experts contacted by e-mail:

- **B. Andersson**
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- **M. Lindqvist**
  VV
- **B. Östlund**
  SIKA Institut
- **R. Pydokke**
  TFK

3.27 SWITZERLAND

List of experts interviewed/mailed

- **Prof. Kay W. Axhausen**
  Eidgenössische Technische Hochschule Zürich
  Institut für Verkehrsplanung und Verkehrssysteme (Institut for transport planning and transport systems
- **Prof. Vincent Kaufmann** (answered questions by e-mail)
  Ecole Polytechnique Federale de Lausanne
  EPFL – Dept. D'Archtitecture

- **Katrin Napravnik**
  Flughafen Zürich (Zurich Airport)
  Unique (Betreibergesellschaft/ operator)
  Commercial & Service (Landside)
  Landside Traffic
  Abteilungsleiterin (Head of Department)
- **Andreas Gantenbein**
  ASTRA – Bundesamt für Straßen (Federal office for roads), Bern
- **Dr. phil. nat. Ulrich Seewer**
  Bundesamt für Raumentwicklung (ARE – Federal office for spatial development)

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- TEC:
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