



INTERCONNECT

INTERCONNECTION Between Short- and Long-Distance Transport Networks

**INTERCONNECT DELIVERABLE D3.1
AN ANALYSIS OF POTENTIAL SOLUTIONS FOR
IMPROVING INTERCONNECTIVITY OF PASSENGER
NETWORKS**

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EXECUTIVE SUMMARY

INTERCONNECT is an EU funded project with partners in the UK, Germany, Denmark, Poland, Spain and Italy. The focus of INTERCONNECT is upon local and regional interconnections in the context of longer distance passenger journeys and starts from the premise that, with the continuing increase in trip length in interregional travel, effective interconnection between trip legs is becoming a necessary feature of a growing proportion of passenger journeys, particularly those which contribute most to the regional and national economies.

Effective interconnection requires the provision of integrated networks and services which are attractive to potential users and this is likely to require co-operation between a range of authorities and providers in the public and private sectors and may necessitate a wider vision than might otherwise prevail. Moreover, the creation of effective interconnection may sometimes conflict with the priorities of authorities and providers who have hitherto been concerned solely with serving a local constituency.

The project addresses the potential for greater efficiency and reduced environmental impact of passenger transport by judicious encouragement of integration, co-operation and, where appropriate, competition in the provision of these local connections. Thus the project encompasses physical characteristics of the network, characteristics of the modes, the coordination of operators as well as integration, and the cohesiveness of multi-modal networks.

It should be noted that the project's scope is limited to trips of at least 100 km which include use of at least one short-distance feeder/distributor journey stage. The project is concerned with improvements to the short distance feeder stage(s) and with their interconnection with the long-distance stage. Improvements to the long-distance stage are out-of-scope, as are any improvements at airports that are not on land-side, including all security procedures.

The project began with a review of published data on long distance travel within Europe and of literature on the problems of poor interconnection and on solutions which have been proposed or introduced. This was followed by a more detailed, thematic, consideration of potential solutions and by identification of case studies.

A key output from the project, in line with objectives 2 and 3 above, is a "Toolkit" which identifies and assesses potential solutions (94 in total). It is this toolkit that is the focus of this document.

Section 1 of this report outlines the key problems of poor connectivity which are associated with:

- a. Non provision (or inadequate standard) of the infrastructure for local links;
- b. Poor design, maintenance or operation of modal interchange points;
- c. Inefficient procedures for interchange (e.g. delays while waiting for luggage);
- d. Inadequate provision of local transport services (e.g. no fast public transport from an airport to city centre);
- e. Local transport services exist but do not serve the needs of connecting long-distance travellers (e.g. timetables are uncoordinated, nearest bus stop requires a long walk);
- f. Inadequate provision of information; or
- g. Unavailability of integrated tickets (covering the local as well as the long distance parts of the journey).

In an attempt to help policy makers address these key problem areas a toolkit of 94 potential solutions has been developed. Section 1 goes on to outline how to make best use of the toolkit and to provide the reader with some of the logic behind the assessment of solutions and how each of the solutions have been defined and categorised. This section also contains a set of assessment matrices which summarise each category of solutions in matrix form, with the columns representing 12 assessment criteria as follows:

1. Indicative cost of implementing the solution

2. Technical feasibility
3. Financial feasibility
4. Organisational/legal feasibility
5. Acceptance by users
6. Other aspects of political acceptability (in addition to expected acceptance by users)
7. Impact on users' door to door travel time
8. Impact on users' door to door travel cost
9. Initial impact on comfort or convenience of the users' journey
10. Any detectable increase in users' safety
11. Any detectable increase in users' personal security
12. Any detectable increased access for people with reduced mobility

For each solution a rating score is given for each of the assessment criteria. In this way the reader is able to absorb the key characteristics of the solutions in a time effective way. If they require more detailed information they can refer to the full text within sections 2 to 8.

Sections 2 to 8 of this report present the toolkit solutions as a series of solution categories. There are 7 categories in total as outlined below:

1. Local link infrastructure
2. Local transport services
3. Improvements at the interchange point
4. Check-in and luggage transfer
5. Ticketing and pricing
6. Marketing, information and sales
7. Enabling solutions

Inevitably there will be some overlap between the seven categories but using this structure has enabled a rather indigestible list to be ordered in a useful manner. It should be stressed however that toolkit users should not confine their search for solutions solely to those in a single category, rather they should be prepared to investigate several categories in order to gain a fuller picture of what mix of solutions could be applied.

1 INTRODUCTION & THE TOOLKIT

1.0 INTRODUCTION OF THE PROJECT

INTERCONNECT is an EU funded project with partners in the UK, Germany, Denmark, Poland, Spain and Italy.

It focuses on local and regional interconnections in the context of longer distance passenger journeys and starts from the premise that, with the continuing increase in trip length in interregional travel, effective interconnection between trip legs is becoming a necessary feature of a growing proportion of passenger journeys, particularly those which contribute most to the regional and national economies.

Effective interconnection requires the provision of integrated networks and services which are attractive to potential users and this is likely to require co-operation between a range of authorities and providers in the public and private sectors and may necessitate a wider vision than might otherwise prevail. Moreover, the creation of effective interconnection may sometimes conflict with the priorities of authorities and providers who have hitherto been concerned solely with serving a local constituency.

The project addresses the potential for greater efficiency and reduced environmental impact of passenger transport by judicious encouragement of integration, co-operation and, where appropriate, competition in the provision of these local connections. Thus the project encompasses physical characteristics of the network, characteristics of the modes, the coordination of operators as well as integration, and the cohesiveness of multi-modal networks.

The particular focus of INTERCONNECT are those journeys which might benefit from more effective interconnection between different modes and services, and on those situations where effective interconnection is currently hampered by institutional barriers, lack of investment, or failure to innovate. By identifying examples of good practice from Europe and elsewhere, the project will show how these situations could benefit from a more enlightened approach.

The project's general objectives are:

1. To reveal the extent, impact and causes of poor interconnectivity;
2. To identify existing good practise and potential solutions, analyse them using appropriate methods and establish their likely contribution to improving interconnectivity; and
3. To disseminate the findings widely and promote take-up of best practice.

It should be noted that the project's scope is limited to trips of at least 100 km which include use of at least one short-distance feeder/distributor journey stage. The project is concerned with improvements to the short distance feeder stage(s) and with their interconnection with the long-distance stage. Improvements to the long-distance stage are out-of-scope, as are any improvements at airports that are not on land-side, including all security procedures.

The project began with a review of published data on long distance travel within Europe and of literature on the problems of poor interconnection and on solutions which have been proposed or introduced. This was followed by a more detailed, thematic, consideration of potential solutions and by identification of case studies.

A key output from the project, in line with objectives 2 and 3 above, is a "Toolkit" which identifies and assesses potential solutions.

Initial conclusions on the usefulness of potential solutions were assembled in a "preliminary assessment" document which was discussed with practitioners and researchers at a meeting in July 2010 held in a special session of the World Conference on Transport Research (WCTR). The structure, and some of the initial assessments, were refined in the light of comments received and further findings from the project. A revised document was then prepared and issued for further comments from stakeholders in October 2010. The stakeholders provided a range of opinions, reflecting their diverse backgrounds, but there was overwhelming endorsement of the structure and content of the toolkit and of the assessments contained within it. A number of additional examples of

good practice were identified and were added to the relevant sections. Further consultation was undertaken with stakeholders in the form of an online questionnaire. This was conducted during October and November 2010 with INTERCONNECT partners contacting 131 relevant stakeholders. This resulted in 36 stakeholders taking part in the online survey coming from a wide range of backgrounds as follows:

1. Politician/decision maker (8%)
2. International civil servant or official (6%)
3. National or local government employee (28%)
4. Local transport service supplier (6%)
5. Long distance transport service supplier (17%)
6. A transport interchange owner or operator (14%)
7. An independent analyst or researcher (31%)
8. A long distance traveller (36%)
9. Other (11%)

The stakeholders' opinions on the seriousness of different problems, the prioritisation of different categories of solution, the relevance of different criteria, and the potential usefulness of individual solutions are referred to where appropriate. The draft toolkit produced in November 2010 was further refined in the light of findings from our investigation of case studies and our testing of solutions in Workpackage 4.

Another further final round of consultation was undertaken with those stakeholders who had taken part in the online survey during January and February 2011; with the toolkit report adjusted to take into account their comments. A final review of the toolkit was undertaken internally during March 2011 before the current version was finalised at the end of March 2011.

This document is structured as envisaged at Milestone 3.2 ("Framework for the toolkit") with amendments following feedback from stakeholders and further work in Workpackage 3. It contains the assessments of the effectiveness of solutions to the problem of poor local connectivity in long distance trips and represents further development of the material included in the preliminary assessment document at Milestone 3.3 and the Draft Toolkit at Milestone 3.4. It draws on work conducted in Work packages 3 and 4 and on the results of consultation with stakeholders in Workpackage 6.

1.1 HOW TO USE THE TOOLKIT

1.1.1 Making Best Use of the Toolkit

This toolkit refers to 94 potential solutions to the problems of poor interconnectivity experienced by long distance travellers whose journeys require them to use short distance "local" mode(s) to commence and/or complete their journeys.

The toolkit comprises:

- A list of 94 potential solutions (The contents list for sections 2-8)
- A brief description of the problems of interconnectivity (Section 1.1.2)
- A discussion of the criteria by which to judge the usefulness of different solutions (Section 1.1.3)
- Text descriptions of each of seven categories of solution (Section 1.1.4 and repeated at the starts of Sections 2-8)
- Matrices summarising the usefulness of the 94 identified solutions (Section 1.1.5).
- Text descriptions of each of the 94 identified solutions, including examples of their application, references and links to more detailed case studies and sources of information (sections 2-8)

The toolkit can be used in a number of different ways, but one or other of the following are recommended (although, it is always recommended that the user begin by reading sections 1.1.2, 1.1.3 and 1.1.4):

- A. **If the user has a candidate solution in mind and wishes to learn more about that solution** - read the full article on the solution and follow up any links and references provided.
- B. **If the user has a set of candidate solutions in mind and wishes to compare them** - go to the assessment matrices and compare their applicability and performance as summarised. The relevant text can be found in the body of the report and will provide more detail.
- C. **If the user has particular problems in mind but has no prior opinion on the candidate solutions** – go to the assessment matrices and identify solutions which perform well on the relevant criteria. Relevant text can be found in the body of the report if more detail is required.
- D. **If the user has particular categories of solutions in mind and wishes to compare the solutions within those categories** – he or she should first read Section 1.1.4 to ensure that all the relevant categories have been identified, identify the relevant assessment matrices, and, within those matrices, identify solutions which perform well on relevant criteria, then consult the relevant text for more detail on those solutions.

1.1.2 Problems of Poor Connectivity

Before launching into the solutions, it is perhaps useful to summarise the project's understanding of the main problems affecting the local connectivity of long distance trips.

From the traveller's perspective, the main problems are delays, inconvenience, and costs associated with the local leg of the trip, which seem out of proportion to the relatively short distances involved. This delay, inconvenience and cost may be incurred at the point of interchange (e.g. within an airport) or en route between that interchange and the origin or destination of the trip.

The problems may seem to be associated with:

- a. Non provision (or inadequate standard) of the infrastructure for local links;
- b. Poor design, maintenance or operation of modal interchange points;
- c. Inefficient procedures for interchange (e.g. delays while waiting for luggage);
- d. Inadequate provision of local transport services (e.g. no fast public transport from an airport to city centre);
- e. Local transport services exist but do not serve the needs of connecting long-distance travellers (e.g. timetables are uncoordinated, nearest bus stop requires a long walk);
- f. Inadequate provision of information; or
- g. Unavailability of integrated tickets (covering the local as well as the long distance parts of the journey).

At a deeper level, the problems may be a consequence of financial, organisational, regulatory or commercial factors which act as barriers to the effective integration of different transport services.

The stakeholders opined that problems a, b and f had the most serious consequences for long distance travellers in Europe but that, from a cost-benefit perspective, solutions to problems f and c should be given the highest priority.

1.1.3 Assessment of Solutions

List of criteria

The solutions have been assessed against a number of criteria. The list of criteria was agreed by the project team following an extended process of suggestion, discussion and amendment. Several additional criteria were considered, but eventually rejected on the grounds that they would apply only

to a subset of the solutions or would not provide any useful degree of discrimination between the solutions. The final list is:

1. Indicative cost of implementing the solution
2. Technical feasibility
3. Financial feasibility
4. Organisational/legal feasibility
5. Acceptance by users
6. Other aspects of political acceptability (in addition to expected acceptance by users)
7. Impact on users' door to door travel time
8. Impact on users' door to door travel cost
9. Initial impact on comfort or convenience of the users' journey
10. Any detectable increase in users' safety
11. Any detectable increase in users' personal security
12. Any detectable increased access for people with reduced mobility (including those with physical disabilities or infirmities, those carrying heavy luggage and those accompanied by young children)

The stakeholders opined that criteria 7, 5, 1 and 3 were the most important ones in this list. In addition other impacts are considered when especially relevant for the solutions, (i.e. Greenhouse Gas (GHG) emissions, congestion and accessibility) and appear under the 'Other Impacts' heading.

The assessment levels for each criterion

The levels identified for each criterion were decided following extensive discussion. The levels eventually agreed are designed to be useful (allowing a degree of discrimination between different solutions) but practical (not requiring information to which we did not have access).

The levels agreed for each criterion, and the scoring thresholds used, are defined in section 1.1.5.

1.1.4 Definition and Categorisation of Solutions

The 94 solutions have been defined generically rather than with reference to a specific geographical location. However, it is recognised that their performance and impact will usually depend crucially on the specific application context. Where there are a number of different potential contexts and where this makes a difference to the likely performance against a number of criteria, variant solutions were identified (e.g. one for major airport hubs and one for other airports). Where there is clearly one dominant context, only one solution was defined and scored for that context – but with notes in the text to indicate how the assessment score would differ, if the solution were applied in some other context.

For each solution there is:

- A brief description of the solution;
- A short description of the problems it seeks to address;
- A summary of its applicability (described in terms of pre-requisites and barriers to implementation);
- The circumstances in which it would be particularly appropriate and the circumstances in which it would be inappropriate or difficult to implement);
- A commentary on the scores recorded in the matrix for this solution;
- Comments on any other impacts that are particularly relevant for this particular solution; and
- Examples of the application of this solution.

The 94 solutions have been categorised under seven headings:

1. Local link infrastructure
2. Local transport services
3. Improvements at the interchange point
4. Check-in and luggage transfer
5. Ticketing and pricing
6. Marketing, information and sales
7. Enabling solutions

Although there is inevitably some overlap between the seven categories, they help to put some structure in what would otherwise have been a rather indigestible list. It is, however, important that toolkit users do not confine their search for solutions solely to those in a single category. For example, if searching for ways in which local transport services might be improved, it is important to look at categories 5 and 6 as well as category 2.

More detail on each of the seven categories is provided below:

The **Local link infrastructure** category includes those solutions which seek to address the problem of inadequate infrastructure for the link between an interchange (such as an airport) and the centre of the city which it serves. The question of financial feasibility is very important for many of these solutions. The initial investment by government (local, regional, national or supranational, a special purpose authority, or the private sector, will generally be recouped by usage charges which are met, directly or otherwise, by end users. The assessment of overall financial feasibility is based on a judgement as to whether the initial and ongoing costs could be recouped in this way.

The **Local transport services** category includes those solutions which concern improvements to the organisation of local transport services which could be achieved without major investment in new infrastructure.

The category labelled **Improvements at the interchange point** includes those solutions which address problems experienced at the modal interchange point (e.g. within airports or at major rail stations or ports). It includes improvements to infrastructure which will facilitate movement within the interchange facility, design details which should make movement easier and quicker, and other interventions designed to make the time spent within the interchange more pleasant or productive. Some of these solutions, e.g. car parks and traveller facilities, may generate revenues, but most do not – except indirectly in so far as they might contribute to the attractiveness of the interchange. Their financial feasibility may thus be an issue.

A special category is included for solutions which concern **Check-in and luggage transfer**. Although primarily procedural, all will require some investment in infrastructure and information technology. Even where they do not directly generate additional revenue, the financial case for them may be based on the fact that they may attract additional passengers. Note that, as stated in the introduction, changes to procedures and facilities associated with the long-distance leg of the journey are beyond the scope of this document.

Ticketing and pricing solutions concern the provision of integrated pricing and/or ticketing for the individual components of long distance journeys. The idea being that this will make a multi-leg journey easier to understand, plan and execute. The general justification for providing “seamless” journeys is that it would reduce the effort involved in making such journeys.

A distinct group of solutions involving **Marketing, information and sales** was identified and includes branding, the provision of information and new sales channels. The idea being that this will make a multi-leg journey easier to plan and execute and will help users identify and access the most appropriate options for their journey.

A final, rather different, category of interventions was identified comprising **Enabling solutions** which, while not providing a complete solution to problems affecting end users, seek to facilitate the implementation of more specific solutions by reforming aspects of the operating environment. Many of the impacts of these solutions would come about only indirectly – because some other development is facilitated. These enabling solutions generally involved regulatory or organisational changes.

1.1.5 Assessment Matrices

The following set of matrices outline the key assessments for each solution as categorised under the seven headings outlined in section 1.1.4. Before that is it worth outlining the criteria and score levels used in the assessment matrices.

The columns in the assessment matrices are outlined and described as follows:

1. **A unique ID code for this solution** (alphanumeric)
2. **Short title for solution** (max 38 characters)
3. **Indicative cost of the solution in the first five years, i.e. full implementation costs plus costs for five years of operation and maintenance** (to help the user to get a quick idea of the scale of the “solution”).
 - € total cost per application likely to be low (below €1m)
 - €€ total cost per application likely to be high (in the range €1m to €10m)
 - €€€ total cost per application likely to be very high (above €10m)
4. **Technical feasibility**
 - **XX** likely to face serious technical barriers to implementation which are insurmountable in the short term
 - **X** likely to face serious technical barriers to implementation
 - **0** unlikely to face any serious technical barriers to implementation.
5. **Financial feasibility**
 - **XX** likely to face serious financial barriers to implementation which are insurmountable in the short term
 - **X** likely to face serious financial barriers to implementation
 - **0** unlikely to face any serious financial barriers to implementation
 - **✓** likely to generate profit
6. **Organisational/legal feasibility**
 - **XX** likely to face serious organisational/legal barriers to implementation which are insurmountable in the short term
 - **X** likely to face serious organisational/legal barriers to implementation
 - **0** unlikely to face any serious organisational/legal barriers to implementation
7. **Acceptance by users**
 - **XX** likely to face serious barriers to implementation which are insurmountable in the short term
 - **X** likely to face serious barriers to implementation
 - **0** unlikely to face any serious barriers to implementation
 - **✓** likely to be very popular with potential users
8. **Other aspects of political acceptability** (over and above expected acceptance by users)
 - **XX** likely to face serious political barriers to implementation which are insurmountable in the short term
 - **X** likely to face serious political barriers to implementation
 - **0** unlikely to face any serious political barriers to implementation
 - **✓** likely to be very popular politically

9. Impact on users' door to door travel time

- X likely to increase travel time (by at least 10 minutes)
- 0 likely to have minimal effect on travel time (less than 10 minutes difference)
- ✓ likely to decrease travel times moderately (in the range 10 minutes to 1 hour)
- ✓✓ likely to decrease travel times significantly (by more than 1 hour)

10. Impact on users' door to door travel cost

- X likely to increase travel cost (by at least €5)
- 0 likely to have minimal effect on travel cost (less than €5 change)
- ✓ likely to decrease travel cost moderately (in the range €5 to €50)
- ✓✓ likely to decrease travel cost significantly (by more than €50)

11. Impact on comfort or convenience of the users' journey – including the process of planning the journey and purchasing tickets as well as the journey itself (note that we consider only the initial impact effect before any consequential increase in crowding due to any additional passengers attracted by the improved service)

- X likely to make journey less comfortable or less convenient (change unwelcome to most users)
- 0 likely to have minimal effect on journey comfort or convenience (most users would probably not care)
- ✓ likely to produce moderate increase in journey comfort or convenience (improvement welcomed by most users)
- ✓✓ likely to produce significant increase in journey comfort or convenience (improvement strongly welcomed by most users)

12. Any detectable increase in users' safety (fatalities or injuries in accidents)?

- X likely to have negative overall impact on personal safety
- 0 unlikely to have any detectable overall impact on personal safety
- ✓ likely to have positive overall impacts on personal safety

13. Any detectable increase in users' personal security

- X likely to have negative overall impact on personal security
- 0 unlikely to have any detectable overall impact on personal security
- ✓ likely to have positive overall impacts on personal security

14. Any detectable increased access for people with reduced mobility

- X likely to have negative overall impact on access by people with reduced mobility
- 0 unlikely to have any detectable overall impact on access by people with reduced mobility
- ✓ likely to have positive overall impacts on access by people with reduced mobility

Table 1-1 Assessment matrix for local link infrastructure solutions

Section	Title	Cost	Tech feas.	Fin feas.	Org feas.	User accep	Polit feas.	D2D time	D2D cost	Cmft & cnv	Safety	Secu.	Mob
2.1	Ferry link	€ - €€€	0	X-√	0	√	0	X-√√	√	√-√√	0	0	0
2.2	Maglev link	€€€	0	XX	0	√	√	0-√√	0	√√	√	0	√
2.3	Link into general HSR system	€€€	0	XX-X	0	√	√	√-√√	0	√√	√	0	0
2.4	Dedicated HSR link	€€€	0	XX-X	0	√	√	√	0	√√	√	0	√
2.5	Link into heavy rail system	€€-€€€	0	XX-X	0	√	√	√	0	√√	√	0	0
2.6	Metro / S-Bahn link	€€€	0	XX-X	0	√	√	√	0	0	√	0	0
2.7	Tram link	€€€	0	XX-X	0	√	√	√	0	√	√	0	0
2.8	Monorail / People Mover	€€-€€€	0	XX-X	0	√	√	√	0	√√	√	0	√
2.9	Motorway link	€€€	0	XX-X	0	√	X-√	√-√√	√	√	√	0	0
2.10	Park and Ride	€ - €€€	0	X-√	0	√	√	0-√	0	√√	0	0	0
2.11	TramTrain or TrainTram	€€€	X-0	XX-√	XX-0	√	√	0-√	0	√√	√	0	√
2.12	Guided bus link	???	0	X	0	√	0-√	√	0	√	√	0	0
2.13	Segregated bus lanes	€€	0	X	0	√	0-√	0-√	0	√	√	0	0
2.14	In-road bus lanes	€	0	0	0	√	X-√	0-√	0	√	√	0	0
2.15	HOV lane	€ - €€	0	X-√	0	√	X-√	√	0	√	0	0	0
2.16	Cycle path link	€	0	X-0	0	√	√	X	√	0	√	X	0
2.17	Improved maintenance and earlier replacement of infrastructure	€ - €€€	0	X-√	X-0	√	√	0-√	0	√√	√	0	√
2.18	Vehicle upgrade for increased comfort	€ - €€	0	X-√	0	√	√	0	0	√√	√	√	√

Table 1-2 Assessment matrix for solutions involving improvement of local transport services

Section	Title	Cost	Tech feas.	Fin feas.	Org feas.	User accep	Polit feas.	D2D time	D2D cost	Cmft & cnv	Safe	Secu.	Mob.
3.1	Robust schedules	€	0	X-√	XX-0	√	0	X-√	0	√√	0	0	√
3.2	Integrated timetabling	€	X	0	X	√	0	√	0	√	0	√	0
3.3	Regular interval timetabling	€	0	0	X	√	0	X-√	X - √	0	0	0	0
3.4	Adding short 'spokes' to a hub	€	0	0	0	X-√	0-√	X-√	X - √	√	0	0	0-√
3.5	Higher service frequency	€ - €€€	0	XX-√	XX-0	√	0	0-√√	√	√-√√	0-√	0	0-√
3.6	Service re-routing	€	0	0	0	X-√	0	√	0	√	0	0	X-√
3.7	Direct shuttle or express services	€-€€	X-0	X-√	X-0	√	0	√-√√	0	0-√√	0	√	√
3.8	Addition of intermediate stops	€	0	0-√	X-0	X-√	0	X-√	0	0-√	0	0	√
3.9	Demand-responsive bus service	€	0	X-√	0	√	0	X-0	√	√-√√	0	√	√
3.10	Dedicated shared-ride taxi service	€-€€	0	X-√	0	√	0	X-0	√	√-√√	0	√	√√
3.11	Link into general bus lines	€	0	0	0	√	0	X-√	√	√	0	0	√
3.12	Shuttle bus between interchanges	€	0	X-√	0	√	0	X-√√	√	√	√	√	√
3.13	Provision of short feeder flights	€€ - €€€	0	X-√	0	√	0-√	√√	√	√√	√	0	√

Table 1-3 Assessment matrix for solutions involving improvements at the interchange

Section	Title	Cost	Tech feas.	Fin feas.	Org feas.	User accep	Polit feas.	D2D time	D2D cost	Cmft & cnv	Safe	Secu.	Mob.
4.1	Additional, conveniently located, car parks	€ - €€€	0	X-√	0	√	√	0 - √	X-0	√	0	√	√
4.2	Conveniently positioned local transport services	€ - €€€	0	X-0	0	√	√	0	0	√-√√	0	√	0
4.3	Convenient position of taxi ranks	€ - €€	0	X-0	X-0	√	√	0	0	√	0	√	0
4.4	Cycle facilities at rail stations	€ - €€	0	X-0	0	√	√√	0	0-√	√	0	0	0
4.5	Provision of moving walkways	€€-€€€	0	X	0	√	√	0	0	√-√√	0	0	√
4.6	Provision of elevators / escalators	€ - €€	0	X-0	0	√	√	0	0	√-√√	0	0	√
4.7	Level access to trains and buses	€ - €€	0	X-0	0	√	√	X-√	0	√-√√	0	0	√
4.8	Visibility axes between modes	€ -€€€	XX-0	X-0	0	√	√	0-√	0	0-√	0	√	0-√
4.9	Direct logical paths	€ -€€€	XX-0	X-0	0	√	√	0 - √	0	0-√	0	√	0-√
4.10	Assistance for disabled travellers	€	0	X-0	0	√	√	0 - √	0 - √	√√	√	0	√√
4.11	(Tactile) Guidance systems for disabled	€ - €€	0	X-0	0	√	√	0 - √	0 - √	√√	√	0	√
4.12	Improved lighting	€	0	X-0	0	√	√	0 - √	0	√	√	√	0-√
4.13	Increased space and comfort in waiting areas	€ - €€	X-0	X-0	0	√	√	0	0	√	√	0	√
4.14	Provision of services for travellers	€ - €€	0	X-√	0	√	√	0	0	√-√√	0	0	0
4.15	Train information / tickets in baggage claim area	€	0	X-0	X-0	√	√	0 - √	0	√	0	0	0
4.16	Multilingual or pictogram information	€	0	0	0	√	√	0	0	√-√√	0	0	0
4.17	Improved availability of staff	€ - €€	0	X	0	√	√	0	0	√-√√	√	√	√√
4.18	Provision of surveillance cameras	€	0	0	0	X-√	X-√	0	0	0-√	√	√	0
4.19	Demand management on access modes	€ - €€	0	X-√	X-0	√	XX	0 - √	X-√	0	0	0	0
4.20	Multi-modal information & ticketing booths	€ - €€	0	X-0	X-0	√	√	0 - √	0	√	0	0	0

Table 1-4 Assessment matrix for solutions involving improved check-in or luggage transfer

Sect-on	Title	Cost	Tech feas.	Fin feas.	Org feas.	User accep	Polit feas.	D2D time	D2D cost	Cmft & cnv	Safety	Secu.	Mob
5.1	At-station passenger check-in for flights	€	0	X-√	X-0	√	0	0-√	0	√√	0	0	√
5.2	In-train passenger check-in for flights	€	0	0-√	XX	√	0	0-√	0	√	0	0	0
5.3	Full check-in at airport rail station	€€	0	0	0	√	√	0 - √	0	√-√√	0	0	√
5.4	Door-to-door luggage transport	€ - €€	0	√	0	√	√	√	X	√√	√	√	√√
5.5	Flight luggage check-in at rail station	€€ - €€€	0	XX	X-0	√	X -√	0	X-0	√√	√	√	√
5.6	Early issue of luggage labels	€	0	0	X	√	X -√	0	0	√	0	XX	0
5.7	Post-flight luggage collection from station	€	0	√	X	√	√	0	X	√√	0	XX	√
5.8	RFID tagging for luggage	€€ - €€€	0	X-0	X-0	√	√	0 - √	0	√	0	0	0
5.9	Self service luggage check in and drop off	€€ - €€€	0	X-0	0	0-√	0	0 - √	0	√	0	0	0

Table 1-5 Assessment matrix for solutions related to ticketing and pricing

Section	Title	Cost	Tech feas.	Fin feas.	Org feas.	User accep	Polit feas.	D2D time	D2D cost	Cmft & cnv	Safe	Secu.	Mob
6.1	Pre-paid tickets /cards for unlimited travel	€- €€	0	0	X	✓	✓	0-✓	0-✓	✓✓	0	0	✓
6.2	Simple tariff structures	€	0	0	X	✓	X	0-✓	x-✓	✓✓	0	0	0
6.3	Integrated ticketing for all local journeys	€- €€	0	0	X	✓	0 -X	0-✓	x-✓	✓	0	0	0
6.4	Competitive pricing of integrated tickets	€	0	x-0	X	✓	X	0	✓	0	0	0	0
6.5	Integrated ticketing for Air & Rail	€	0	0	X	✓	0	0	x-0	✓	0	0	0
6.6	Pre-booked parking and public transport	€	0	0-✓	X	✓	0	0-✓	x-0	✓	0	0	0
6.7	Integrated ticketing for local public transport & rail	€€	0	0	X	✓	0	0-✓	0	✓	0	0	0
6.8	Inclusion of local taxi in rail and air tickets	€	0	0	X	✓	0	0-✓	0	✓	0	✓	✓
6.9	Smart cards	€€€	0	X	X	✓	✓	✓	0	✓✓	0	0	✓
6.10	Payment via SMS	€	X	0	X	✓	✓	✓	0	✓	0	0	✓
6.11	Virtual tickets on smart phones	€€	X	X	X	✓	✓	✓	0-✓	✓	0	0	✓

Table 1-6 Assessment matrix for solutions related to marketing, information and sales

Section	Title	Cost	Tech feas.	Fin feas.	Org feas.	User accep	Polit feas.	D2D time	D2D cost	Cmft & cnv	Safe	Secu.	Mob
7.1	Common design and content guidelines across operators	€	0	✓	X	✓	0	0	0	✓✓	0	0	0
7.2	Uniform international branding and marketing	€€	0	✓	XX	✓	0	0	0	✓✓	0	0	0
7.3	Pre-trip marketing of connecting services	€	0	✓	X	✓	0	0-✓✓	0-✓✓	✓✓	0	0	✓
7.4	En-route marketing of connecting services	€	0	✓	X	✓	0	0-✓	0-✓	✓	0	✓	0
7.5	Pre-journey information about interchanges	€	0	0	0	✓	✓	0-✓✓	0	✓	0	0	0
7.6	Multi-modal journey planner with ticketing - national	€	X	✓	X	✓	0	0-✓	0-✓	✓✓	0	0	✓
7.7	Multi-modal journey planner with ticketing - international	€€€	XX	✓	XX	✓	X	0-✓✓	0-✓✓	✓✓	0	0	✓
7.8	Local transport ticket sales via Internet	€	0	0	0	✓	0	0-✓	0	✓	0	0	0
7.9	Pricing information & payment systems for international travellers	€	0	0	0	✓	0	0	0	✓	0	0	0
7.10	Smart phone applications	€	0	0	0	✓	0	0-✓	0-✓	✓-✓✓	0	0	0-✓

Table 1-7 Assessment matrix for enabling solutions

Section	Title	Cost	Tech feas.	Fin feas.	Org feas.	User accep	Polit feas.	Specific solutions which might be facilitated
8.1	Single Strategic Authority	€€	0	0	X	0	X	2.1-2.18, 3.1-3.13, 4.1-4.20, 5.1- 5.9, 6.1-6.11, 7.1-7.10
8.2	Voluntary partnerships	€	0	0	X	0	✓	3.1-3.13, 4.1-4.20, 5.1- 5.9, 6.1-6.11, 7.1-7.10
8.3	Intermodal agreements	€	0	0	X	0	0	3.1-3.13, 5.1- 5.9, 6.1-6.11, 7.1-7.10
8.4	Relaxation of antitrust laws	€€	0	X	X	0	X	5.1- 5.9, 6.1-6.11, 7.1-7.10
8.5	Increase competition where none/little exists	€	0	0	X	X	X	5.1- 5.9, 6.1-6.11, 7.1-7.10
8.6	Strengthened Independent regulation	€€	0	X	X	✓	0	3.1-3.13, 4.1-4.20, 6.1-6.11, 7.1-7.10
8.7	Tendering/Franchising/Concessioning	€€	0	X	X	0	X	3.1-3.13, 6.1-6.11, 7.1-7.10
8.8	Serial motorway concessions	€-€€	0	X	X	✓	X	2.9, 2.10, 2.15,
8.9	Joint management of car parks and serial transport services	€-€€	0	0	0	✓	✓	4.1,
8.10	Price regulation for serial rail concessions	€-€€	0	X	X	0	0	6.4,
8.11	Coordination between local public transport and long distance rail operators	€-€€	0	X-0	0	✓	0	3.1-3.13, 6.1-6.11, 7.1-7.10
8.12	Coordinated policy for management of interchange access modes	€	0	0	X-0	x-✓	X	3.1-3.13, 5.1-5.9, 6.1-6.11, 7.1-7.10
8.13	System for fair distribution of ticket revenues	€€	X	✓	XX	0	XX	6.1-6.11, 7.1-7.10

2 LOCAL LINK INFRASTRUCTURE SOLUTIONS

2.0 INTRODUCTION

This group of solutions seek to address the problem of inadequate infrastructure for the link between an interchange (such as an airport) and the centre of the city which it serves.

The question of financial feasibility is very important for many of these solutions. The initial investment by government (local, regional, national or supranational, a special purpose authority, or the private sector, will generally be recouped by usage charges which are met, directly or otherwise, by end users. Our assessment of overall financial feasibility is based on a judgement as to whether the initial and ongoing costs could be recouped in this way.

Stakeholders thought that Solutions 2.5 and 2.3 had particularly high potential to improve interconnectivity and that Solutions 2.5, 2.3 and 2.6 were likely to yield the highest benefit/cost ratios.

The performance of the solutions is summarised in Table 1.1 and a more detailed description of each solution is presented below.

2.1 FERRY LINK

2.1.1 Description

Use of ferries as feeders to long-distance services, ranging from small passenger-only ferries to relatively large car ferries.

2.1.2 Problems Addressed

Journey between interchange and city centre requires significant detour round water.

2.1.3 Applicability

Ferries could provide the link to ports, which are either the starting point for long-distance ferries or, in a number of cases, to railway terminals and airports. They can obviously connect islands to the mainland or each other, but they can also be deployed where building bridges would be too costly.

2.1.4 Performance

Cost The costs depend first of all on the number of ferries needed to provide a service, but in most cases relevant in the context of INTERCONNECT, one single vessel should be sufficient. Costs for vessels vary vastly, from offers on the internet of under €100,000 for 40 year old car ferries that would provide the most basic “no frills” service to several million euros for brand new and more upmarket ones. Adding fuel, maintenance and staff costs to that, a ferry link will never be a low cost-option. If a new port is required, the costs will become very significant, but in most cases the construction of a simple pier will be sufficient and sometimes it will even be possible for a hovercraft to land on a riverbank without the need for a pier.

Technical feasibility As long as the railway station or airport has direct access to a river, canal or the open sea, there are no major technical problems.

Financial feasibility This depends of course on the initial and operating costs and the eventual passenger numbers and fares, and it is not possible to say in general terms whether a ferry service is likely to be profitable or not.

Organisational/legal feasibility There are no organisational or legal impediments to the introduction of a new ferry service.

Acceptance by users Users will generally welcome more direct connections.

Other aspects of political acceptability No problems anticipated.

Impact on users' door to door travel time In most cases new ferry links will substantially reduce travel times.

Impact on users' door to door travel cost This depends entirely on the length of the detour saved on one side and the level of fares on the other.

Initial impact on comfort or convenience A more direct service will always be more convenient, - particularly if it provides an alternative to a congested link - but the level of comfort provided depends very much on the type of vessel used.

Users' safety Ferry services will always be safer than car use.

Personal security A ferry service is not expected to be significantly more secure than any other mode of transport.

Access for people with reduced mobility No specific impact – except that, for people with a physical handicap that prevents them from driving a car, an attractive public transport system will improve their access.

2.1.5 Other Impacts

Where ferries are used within urban conurbations and offer alternatives to congested road links, they may contribute to reducing congestion and GHG emissions.

2.1.6 Examples

Ferries link directly into Marco Polo airport in Venice.

For direct ferry access to rail stations, examples are Stranraer in Scotland, Belfast in Northern Ireland, Holyhead in England and Dublin. In the case of Lisbon, ferries connect to heavy rail as well as to the metro and bus network, and in Amsterdam the central rail station is at the same time the hub for all local ferry services.

2.2 MAGLEV LINK

2.2.1 Description

Use of Maglev (trains using magnetic levitation for lift and propulsion) to link major interchanges to city centres. Maglev is faster, quieter and smoother than wheeled trains.

2.2.2 Problems Addressed

Lack of high speed public transport link between the interchange and the city centre.

2.2.3 Applicability

Maglev can be built to bridge any distance. The shortest one ever in commercial use (1984-1995) only stretched over 600 m from Birmingham airport to the nearby train station.

2.2.4 Performance

Cost The cost of building a Maglev system are extremely high. The Shanghai system cost about €1 billion for 30 km, i.e. €33 million per km¹. The last estimate for the planned system for Munich, that was eventually abandoned, was €90 million per km².

¹ [http://en.wikipedia.org/wiki/Maglev_\(transport\)#cite_note-40](http://en.wikipedia.org/wiki/Maglev_(transport)#cite_note-40) (last opened 1/02/11)

Technical feasibility There are no inherent technical problems with building any Maglev system.

Financial feasibility A Maglev system is highly unlikely to be profitable. The Shanghai system carries 7,000 passengers per day at a fare of around €5, but is not expected to recoup the building costs during its lifetime, not to talk about the operating costs³.

Organisational/legal feasibility No serious problems expected.

Acceptance by users Where Maglev trains have been built, they are extremely popular.

Other aspects of political acceptability Since Maglev trains are quieter and more power efficient than conventional High Speed Rail and, furthermore, are projects with a high prestige, they are generally highly acceptable and popular with politicians and the general population, although their costs are a deterrent and - as with any other new transport link - there will always be protests from those living in the direct neighbourhood of a new track.

Impact on users' door to door travel time If they are only used for a very short stretch as in the case of Birmingham, time savings are relatively small, but at a maximum speed of 581 km/h they can become very substantial at longer distances. The 37 km trip from Munich centre to the airport should have taken only 10 minutes⁴, while the current travel time by S-Bahn is 45 minutes.

Impact on users' door to door travel cost Given the considerations about financial feasibility, the fare for a Maglev system is not easily predictable. It is however likely that any fare for such a prestigious project would be set higher than it would be for a conventional rail system, but by how much will depend on the length of the journey to be undertaken. This could have implications for low income travellers if the Maglev replaced other, cheaper, services.

Initial impact on comfort or convenience The fact that Maglev is quieter and smoother than any rail system will significantly increase travel comfort.

Users' safety In spite of the accident, which was due to human error, on the Emsland test track that killed 23 people in 2006, Maglev is likely to be as safe as conventional rail, and both will be safer than car travel.

Personal security No specific impact expected.

Access for people with reduced mobility No specific impact – except that, for people with a physical handicap that prevents them from driving a car, an attractive public transport system will improve their access.

2.2.5 Other Impacts

Maglev is more energy efficient than equivalent rail. Furthermore it will attract passengers away from car use and thereby not only contribute to a reduction of GHG emissions, but also reduce congestion in urban conurbations. A maglev link from an airport to the downtown end would give a good impression to new arrivals – and hence help project a progressive image for the airport and city.

2.2.6 Examples

There is currently no commercial system in operation in Europe. A 600 m link from Birmingham airport to the nearby rail station was installed in 1984, but discontinued in 1995 due to technical problems. The system planned for the connection between Munich airport and the city centre was abandoned due to spiralling cost estimates.

² http://www.welt.de/muenchen/article1850320/Transrapid_Pleite_trifft_die_CSU_ins_Mark.html (last opened 1/02/11)

³ http://www.atimes.com/atimes/China_Business/IF13Cb02.html (last opened 1/02/11)

⁴ http://de.wikipedia.org/wiki/Transrapid_M%C3%BCnchen (last opened 1/02/11)

2.3 LINK INTO GENERAL HSR SYSTEM

2.3.1 Description

Aligning a High Speed Rail line so that one of its stops is directly adjacent to or contained within an airport or other major interchanges (e.g. a port).

2.3.2 Problems Addressed

Lack of high speed public transport link between interchange and the city(s) that it could serve.

2.3.3 Applicability

In principle, the connection to an HSR line would be beneficial for any airport, but the costs of realigning one to an airport will only be justifiable for routes to larger airports or smaller ones that are intended to grow in order to relieve neighbouring hubs.

2.3.4 Performance

Cost With costs of at least €10 - €20 million per track-km⁵, even where no major tunnelling is needed, HSR links are expensive to build and in addition require high-quality trains.

Technical feasibility HSR does not create any technical problems.

Financial feasibility Even with very high passenger numbers, they tend only to be justified in overall socio-economic terms. As such it is very difficult to imagine a profitable scheme being built.

Organisational/legal feasibility There are no inherent organisational or legal problems.

Acceptance by users HSR systems are very popular and continue to attract high passenger volumes throughout Europe. In the case of Germany, Belgium and France there is also a trend for such systems to attract very significant numbers of air passengers.

Other aspects of political acceptability HSR systems are prestigious and so tend to be politically popular – though there will tend to be some protesters from those whose path the new system will cross during their construction.

Impact on users' door to door travel time The total time saved will depend on the length of the journey, and whether the HSR leg is compared to a car journey (possibly along congested motorways), a conventional rail trip or a short-distance flight - all three of which could be justified for this particular comparison. But given security procedures at airports, HSR should provide some time savings in virtually all cases. If compared with a long bus or coach journey, the travel time gain certainly be significant.

Impact on users' door to door travel cost This again will depend on the basis used for comparisons: HSR is likely to be cheaper than a trip by car with the driver only, but more expensive per passenger than a fully loaded car. If compared to a bus or coach journey, HSR will certainly be more expensive. It is difficult to quantify the actual cost difference however.

Initial impact on comfort or convenience HSR travel is very comfortable and will tend to be more convenient if a direct line can be constructed.

Users' safety Rail travel tends to be safer compared with car travel.

Personal security Rail travel on high-quality trains is, in principle, very secure.

⁵ <http://www.transport-watch.co.uk/transport-fact-sheet-7.htm> (last opened 1/02/11)

Access for people with reduced mobility No specific impact – except that, for people with a physical handicap that prevents them from driving a car, an attractive public transport system will improve their access providing that the system is geared up for their needs.

2.3.5 Other Impacts

HSR links are likely to help reduce congestion both on motorways and in the air through encouraging a modal shift to rail travel; thereby they will also help reduce GHG emissions. High quality rail links from an airport to the downtown tend to give a good impression to new arrivals – and hence help project a progressive image for the airport and city.

2.3.6 Examples

HSR links to airports exist for Paris Charles de Gaulle, Lyon, Amsterdam Schiphol, Frankfurt, Düsseldorf and Leipzig/Halle.

2.4 DEDICATED HSR LINK

2.4.1 Description

Constructing a new HSR link to connect an airport with nearby city(s).

2.4.2 Problems Addressed

Long travel time between airport and city centre(s) and poor connectivity between airports and their catchment areas, i.e. not just the closest city but surrounding cities.

2.4.3 Applicability

For the connection between a major airport and the central station of nearest large city. This could be particularly beneficial where a significant part of travellers in the catchment area may find it more attractive to travel by train and connect to the HSR in the central station than travelling directly to the airport by car, for instance because the airport can only be reached by car through a congested motorway network as in the cases of Cologne/Bonn or Amsterdam Schiphol.

2.4.4 Performance

Cost With at least €10 - €20 million per track-km, even where no major tunnelling is needed, HSR links are expensive to build and, furthermore, they require high-quality trains.

Technical feasibility There is no general problem concerning the technical feasibility.

Financial feasibility Even with very high passenger numbers, they can only be justified in overall socio-economic terms, but they are unlikely to be profitable.

Organisational/legal feasibility No problems expected.

Acceptance by users HSR services are very attractive to users.

Other aspects of political acceptability HSR services are prestigious and tend to be politically popular - as long as they can justify their costs.

Impact on users' door to door travel time An HSR express service will always reduce the travel time compared with an alternative rail or bus service, but the extent of that time reduction is difficult to estimate since it relies on the length of the journey and existing road or rail conditions. For the type of connecting journeys that this project is considering it would be difficult to conceive of time savings exceeding one hour.

Impact on users' door to door travel cost There is likely to be a premium for the fare of an express service.

Initial impact on comfort or convenience HSR generally provides a high level of comfort.

Users' safety Rail travel tends to be safer compared with car travel.

Personal security Rail travel on high-quality trains is, in principle, very secure.

Access for people with reduced mobility No specific impact – except that, for people with a physical handicap that prevents them from driving a car, an attractive public transport system will improve their access providing that the system is geared up for their needs.

2.4.5 Other Impacts

HSR links are likely to help reduce congestion both on motorways and in the air through encouraging a modal shift to rail travel; thereby they will also help reduce GHG emissions. HSR links from an airport to the downtown tend to give a good impression to new arrivals – and hence help project a progressive image for the airport and city.

2.4.6 Examples

Current examples in Europe are links from the city centre to the airports of Oslo, Stockholm, Vienna and London Heathrow ("Heathrow Express").

2.5 LINK INTO HEAVY RAIL SYSTEM

2.5.1 Description

Linking an airport or port to the existing rail network with new track and a railway station in or directly at the airport or port. Or linking existing city based public transport services (buses, metros and suburban rail services).

2.5.2 Problems Addressed

Lack of direct link between the interchange and the rail network and also between urban public transport services and the main rail network.

2.5.3 Applicability

In principle, this could be considered everywhere where a railway line passes within a reasonable distance and / or where the airport or port is within a reasonable distance of the nearest railway station.

2.5.4 Performance

Cost The costs depend of course on the length of the line, the terrain it is going through and the question whether it is entirely a new build or, as a whole or in part, the reopening of one of the many disused railway lines in Europe. For the reopening of the Waverley line in Scotland the costs at 2012 prices are estimated at €5 to €6 million per km⁶. The cost estimate at 2003 prices for connecting Heathrow Terminal 5 with only 4 km of new track to an existing mainline, but including some tunnelling and the new station was at least €370 million⁷. In contrast, the reopening of the Haller Willem line in Germany in 2005 only cost €0.7 million per km, including stations, but even then the operator of the

⁶ <http://www.transportscotland.gov.uk/projects/borders-railway/the-project/delivery-and-funding> (last opened 1/02/11)

⁷ http://www.airtrack.org/images/AirTrack_OBC_Complete%20Version_V2.pdf (last opened 1/02/11)

train gets a public subsidy for running the operation whilst only paying a yearly lease of €0.51 for the rail track⁸.

With regards connecting the urban public transport services to the main rail network the cost of doing so is likely to vary according to what type of public transport services are being run (e.g. should be cheaper to connect buses than say a metro or LRT) and the existing layout and location of the train service (e.g. is there enough space to locate connecting services).

Technical feasibility There are no general problems with regard to the technical feasibility of a project.

Financial feasibility Even with very high passenger numbers, new train lines can usually only be justified in overall socio-economic terms, but are unlikely to ever be profitable.

Organisational/legal feasibility There are no general problems with regard to the organisational and legal feasibility of a project.

Acceptance by users Rail links are popular with users.

Other aspects of political acceptability Rail projects tend, currently, to be politically popular.

Impact on users' door to door travel time Where the alternative to rail travel are bus or car use, there are likely to be time savings, especially if the road network is congested, but the extent of that time reduction is difficult to estimate since it relies on the length of the journey and existing road conditions. For the type of connecting journeys that this project is considering it would be difficult to conceive of time savings exceeding one hour.

Impact on users' door to door travel cost Whether rail or bus travel is cheaper will depend on the local circumstances and tariff system, as such it is difficult to quantify.

Initial impact on comfort or convenience Train travel tends to be more comfortable than car or bus provided that the trains are not overcrowded.

Users' safety Train travel is among the safest of transport modes.

Personal security Security on trains is not significantly different from other modes of public transport or of car use.

Access for people with reduced mobility No specific impact – except that, for people with a physical handicap that prevents them from driving a car, an attractive public transport system will improve their access providing that the system is geared up for their needs.

2.5.5 Other Impacts

A rail link has the clear potential to shift traveller from car to rail use, thereby reducing road congestion as well as GHG emissions.

High quality rail links from an airport to the downtown tend to give a good impression to new arrivals – and hence help project a progressive image for the airport and city.

2.5.6 Examples

There are numerous examples around Europe where airports are linked to the general rail system, for instance Amsterdam, Brussels, Birmingham, Copenhagen, Heathrow, Gatwick, Southampton, and Manchester. Many of these links allow train services which extend beyond the natural catchment of the airport – for example, Manchester Airport's rail links extend to many cities in the north of England. Another example includes the building of the ICE train station at Frankfurt Airport.

⁸ <http://zierke.com/web-page/dissen-osnabrueck> (last opened 1/02/11)

Examples for ports connected to heavy rail are Dagebüll in Germany, (port for two North Sea Islands, Ancona Marittima in Italy (port for Ferries /Jetfoils to Greece and Croatia), Turku satama in Finland (port for ferries to Sweden). Rail services to several ports vanished in the last decades, due to other routes or modes of transport coming up, like Boulogne Aeroglisieurs in France (no more Hovercraft services to UK), Bremerhaven Columbusbahnhof in Germany (no more regular shipping services to America, Brindisi Marittima, Italy (used to be the final destination for the 'Parthenon'-Express from Paris with direct ferry connection to Patras, Greece).

Construction of new railway stations in Warsaw, Wroclaw and Katowice which are strategically positioned to ensure good connection with local public city transport services (metro, buses and suburban rail services; so allowing interconnection with long distance railway services.

2.6 METRO / S-BAHN LINK

2.6.1 Description

Construction of Metro or S-Bahn (rapid urban light rail system that often runs underground in the city centre and generally above ground in the suburbs and beyond) to link major interchange with city centre.

2.6.2 Problems Addressed

Long travel times to airports or central rail stations.

2.6.3 Applicability

Where an S-Bahn can run more or less entirely above ground, the applicability is the same as for a heavy rail system. Where severe tunnelling is needed, the building costs can only be justified in large cities with very high numbers of passengers.

2.6.4 Performance

Cost For track that runs above ground, the costs are slightly lower than those for a heavy rail system, since the trains are lighter and slower and the requirements for the foundations for the track are therefore somewhat lower. Where tunnelling is needed, the costs are extremely high. The tunnel suggested for the Melbourne metro is estimated to cost in the range of €250 million per kilometre⁹.

Technical feasibility There are no problems in principle with building metro and S-Bahn networks.

Financial feasibility Even with very high passenger numbers, they can only be justified in overall socio-economic terms, but will rarely be profitable.

Organisational/legal feasibility There are no problems concerning the organisation or legal feasibility.

Acceptance by users Metro and S-Bahn systems are very popular with users.

Other aspects of political acceptability Metro and S-Bahn systems tend to be prestigious and politically popular.

Impact on users' door to door travel time Where the alternative to modes of travel are bus or car use, there are likely to be significant time savings, especially if the road network is congested, but the extent of these time reductions is difficult to estimate since it relies on the length of the journey and existing road conditions. For the type of connecting journeys that this project is considering it would be difficult to conceive of time savings exceeding one hour.

⁹ http://210.15.220.118/east_west_report/East-West-FactSheet-01_02.pdf (last opened 1/02/11)

Impact on users' door to door travel cost The travel cost will not be significantly higher than that with buses.

Initial impact on comfort or convenience Access and egress may be less straightforward than that to a bus and this may detract from the increased convenience of a faster service.

Users' safety Metro and S-Bahn services tend to be comparable with other rail based forms of transport.

Personal security Where access and egress involve underground passages this could compromise personal security in the evening or night time.

Access for people with reduced mobility No specific impact – except that, for people with a physical handicap that prevents them from driving a car, an attractive public transport system will improve their access providing that the system is geared up for their needs. This is not always the case for underground metro systems.

2.6.5 Other Impacts

Metro and S-Bahn systems are very likely to attract former car users and therefore reduce road congestion and GHG emissions.

High quality rail links from an airport, rail station or port to the downtown tend to give a good impression to new arrivals – and hence help project a progressive image for the relevant city.

2.6.6 Examples

S-Bahn networks can be found in many European cities, several of them (e.g. Munich, Hamburg, Düsseldorf, Mannheim, Erfurt and Vienna) include links to their airports¹⁰.

Many major European cities have metro systems which extend to their airports. Examples include London (Heathrow), Paris, Brussels, and Copenhagen.

The docklands Light railway (DLR) serves London City Airport¹¹ but is not, strictly a metro system – it is a driverless rail system having much in common with a monorail (see 2.8).

2.7 TRAM LINK

2.7.1 Description

Construction of a tram link (light rail running on the road, either mixed in with normal traffic or on segregated tracks) from major interchange to city centre.

2.7.2 Problems Addressed

Bus or coach service between city centre and interchange is, or would be, hampered by congestion. Poor image of bus and coach.

2.7.3 Applicability

Anywhere where passenger numbers are high and the terrain is not too hilly.

¹⁰ http://www.airport.de/en/c_ham21_sbahn.html (last opened 01/02/11)

¹¹ <http://www.londoncityairport.com/ToAndFrom/DLR.aspx> (last opened 01/02/11)

2.7.4 Performance

Cost Tram projects are expensive. The Edinburgh tram system that is currently under construction was originally expected to cost in total, for all elements of the project, in the region of €30 million per km while latest figures indicate that the costs soared to more than €45 per km¹².

Where a tram can go through a less busy environment or open countryside the costs can be reduced considerably. One source (HiTRANS¹³) suggests that the costs for a tram in open country could be as low as €3.4 million per km plus upwards of €120,000 per stop including shelter, ticket vending machine, Cameras and information system. Any traffic priority measures would add another €90,000 to €190,000 per application; each tram would cost, depending on length, between €2.2 million and €3.5 million; and a depot between €300,000 and €400,000.

However, even for an installation in a network of complex city centre streets, the various elements identified by HiTRANS brought together would reach a total that is only around half of the actual costs of the Edinburgh system; where this cost difference comes from is beyond this current analysis, but it means that the figures given by HiTRANS should be viewed with some caution and may be too optimistic, possibly because they do not appear to allow for any of the overheads that are connected with a complex tram project, such as the planning process and the project management.

Technical feasibility There are no general problems concerning the technical feasibility of a tram system as long as the environment is not too hilly.

Financial feasibility According to the business case for the Edinburgh trams, it was expected that in the first year of operation the system would just break even in terms of pure operating costs; for the year 2031 an operating profit of £45 million was projected¹⁴.

Organisational/legal feasibility There are no general problems with a tram project.

Acceptance by users User acceptability is high.

Other aspects of political acceptability Tram systems tend to be politically popular.

Impact on users' door to door travel time Trams tend to be faster than buses due to their being less delayed in general traffic.

Impact on users' door to door travel cost Fares are not likely to be significantly higher than those of buses.

Initial impact on comfort or convenience Trams are generally more comfortable than buses, mainly because of smoother running.

Users' safety Tram use should generally be safer than bus use.

Personal security No particular impact is expected.

Access for people with reduced mobility No specific impact – except that, for people with a physical handicap that prevents them from driving a car, an attractive public transport system will improve their access providing that the system is geared up for their needs. Given that trams tend to operate at ground level this is not expected to be of great concern.

2.7.5 Other Impacts

Tram systems are very likely to attract former car users and therefore reduce road congestion and GHG emissions.

¹² http://news.bbc.co.uk/1/hi/scotland/edinburgh_and_east/8281360.stm (last opened 01/02/11)

¹³ HiTRANS (2005) Public transport – mode options and technical solutions. Best practice guide 4. County of Rogaland, Norway

¹⁴ http://www.edinburghtrams.com/index.php/story_so_far/view_details/7/ (last opened 01/02/11)

High quality tram links from an airport or major rail station to the downtown tend to give a good impression to new arrivals – and hence help project a progressive image for the city in question.

2.7.6 Examples

Tram systems exist in many European cities and, in almost every case, the trams connect to the main rail station. Many cities have tram networks which serve their airports. Examples include: Bremen¹⁵,¹⁶ and Newcastle. Similar links are planned, or under construction, in Edinburgh, Alicante (downtown to HSR station and to Alicante airport¹⁷), and in Tenerife (the L1 extension).

2.8 MONORAIL / PEOPLE MOVER

2.8.1 Description

Construction of monorail (rail system that is either suspended from or rides on a single rail) from major interchange to city centre.

2.8.2 Problems Addressed

Lack of high speed public transport connection between interchange and city centres.

2.8.3 Applicability

Where high numbers of passengers are to be shifted through difficult terrain, in particular across space that has restricted access, such as the airside of airports. Typical applications for bridging short distances are connections between airport terminals, between airports and train stations or between a busy place and the nearest train station.

2.8.4 Performance

Cost The Las Vegas system, built in 2004, cost around €50 million per kilometre¹⁸. The new system in Dubai cost around €40 million per kilometre¹⁹. Both of these systems consist of large trains riding on top of a monorail. The much smaller system, opened in 2002, that links Düsseldorf airport to the main train station and which consists of 2.5 km track with 6 trains with 2 suspended carriages each, cost €150 million in total including €35 million for the airport station²⁰. The 1212 m long extension of a similar system at the University of Dortmund that connects a technology park to an S-Bahn station, opened in 2003, cost €15.5 million including one additional vehicle²¹.

Technical feasibility There are special requirements – such as for safety and evacuation facilities but we are not aware of any insurmountable problems.

Financial feasibility Even with very high passenger numbers, a monorail system can only be justified in overall socio-economic terms; it will not normally be a profitable business. In some cases, it is even being operated without any charge to the passenger as in the case of some of the airport shuttles between terminals and the skytrain in Düsseldorf and Dortmund. The Las Vegas Monorail Company, who had attempted operation as a non-for profit business, had to file for bankruptcy in January 2010 less than six years after it started its operation²². One exception is the system in Tokyo, which connects Haneda airport and Hamamatsucho, and which is a profitable business. From the creation in 1964 it noted increasing profit until 1998 when competition from a new rail line resulted in a

¹⁵ <http://www.airport-bremen.de/en/service/> (last opened 01/02/11)

¹⁶ http://de.academic.ru/pictures/dewiki/83/Stadtbahnnetz_Erfurt.png (last opened 01/02/11)

¹⁷ http://en.wikipedia.org/wiki/Alicante_Train (last opened 01/02/11)

¹⁸ <http://www.monorails.org/tmsspages/News.html#Anchor-Abrupt-49575> (last opened 01/02/11)

¹⁹ <http://www.dubaifaqs.com/palm-jumeirah-monorail.php> (last opened 01/02/11)

²⁰ <http://de.wikipedia.org/wiki/SkyTrain> (last opened 01/02/11)

²¹ <http://de.wikipedia.org/wiki/SkyTrain> (last opened 01/02/11)

²² <http://www.freerepublic.com/focus/f-news/2428397/posts> (last opened 01/02/11)

decrease in passengers. Despite this, JR, which is a private company and owner of 70% shares in the monorail system, still pressed ahead with extending the monorail line; which would indicate that they believe it was still a viable business, even despite the presence of new competition.

Organisational/legal feasibility There are no particular problems.

Acceptance by users Monorail systems are very popular with users.

Other aspects of political acceptability Monorail systems are prestigious and are generally politically popular unless they have too much impact on the visual character of a place. They tend to be regarded as out of place in historic surroundings – unless, as in Wuppertal (where the monorail was opened in 1901), they are themselves historic.

Impact on users' door to door travel time Since the monorail can take a very direct route it will tend to be faster than a bus based public transport system or a private car.

Impact on users' door to door travel cost The fares will be in a similar range as bus fares.

Initial impact on comfort or convenience Monorail systems tend to be very comfortable.

Users' safety Monorail systems are very safe. The Wuppertal system had one serious accident with four casualties in 110 years of operation.

Personal security No specific impact.

Access for people with reduced mobility No specific impact – except that, for people with a physical handicap that prevents them from driving a car, an attractive public transport system will improve their access, providing that the system is geared up for their needs.

2.8.5 Other Impacts

Monorail systems are very likely to attract former car users and thereby reduce road congestion and GHG emissions.

Monorail links from an airport or main railway station to the downtown tend to give a good impression to new arrivals – and hence help project a progressive image for the city.

2.8.6 Examples

Applications for bridging short distances are the connections between airport terminals e.g. Frankfurt or Gatwick, between airports and train stations, e.g. Düsseldorf, or between a busy place and a train station, e.g. Dortmund.

Examples for larger systems are Las Vegas or Dubai from the newer systems as well as the oldest one in the world, namely the 'Wuppertaler Schwebebahn' in Germany, which opened in 1901.

2.9 MOTORWAY LINK

2.9.1 Description

Building a new motorway to establish high speed road link from a major interchange to the city centre.

2.9.2 Problems Addressed

Current road links have insufficient capacity (or have low design speed) or do not provide a direct link between key origins and destinations.

2.9.3 Applicability

Given traffic volumes and general environment, this is only ever likely to be a solution for providing access to and from airport and city centres.

2.9.4 Performance

Cost According to information released by the UK Highways Agency in 2005, the average cost of building a new motorway was €40 million per km²³. The published costs for the German section of the new motorway between Dresden and Prague, opened in 2006, were around €15 million per kilometre²⁴, so much lower than those given by the Highways Agency. However, according to the German TV magazine 'Report' the total costs for a German motorway are above €26 million, out of which only €11.8 million are the actual construction cost, but among the other costs to be added are €9.5 for "bureaucracy" and €5 for the various appraisals²⁵, which brings it back into line with the UK figures.

Technical feasibility There are no general technical problems.

Financial feasibility Most motorways in Europe are free for use, because they are regarded by their owners as public infrastructure. However, some motorways, most prominently in France and Italy are operated on a commercial basis. The Italian motorway sector is regulated. The regulation framework, since the beginning and across its entire evolution, has always dealt only with economic and financial aspects. The various versions of the discipline have constantly aimed at promoting toll levels high enough to cover concessionaires' costs but relatively low for motorway users. The different agreements over years among the subjects involved led to a situation of different levels of profitability for the motorway operators. However, such profitability is generally large for all the existing operators. Additionally in the case of motorways connecting to airports, it may be possible to reduce the public commitment by involving the airport. For instance, the motorway to the new Bangkok Airport was to 50% financed by the airport.

Organisational/legal feasibility There are no general organisational or legal problems.

Acceptance by users Where new motorway are being built they very quickly attract traffic.

Other aspects of political acceptability Although motorways can be prestigious projects, there are often local objections to building new motorways and, depending on the local planning processes, these objections can be difficult to overcome. In the above mentioned case of the motorway between Dresden and Prague, the last 16 km had not been ready yet on the Czech side due to environmental protesters, when the rest of the motorway was officially opened.

Impact on users' door to door travel time Motorways tend to significantly reduce travel times.

Impact on users' door to door travel cost Vehicle operating costs increase with higher speed, but this can be compensated by the free-flowing traffic found on motorways compared with urban roads with much more stop-and-go traffic.

Initial impact on comfort or convenience Motorways provide more driving comfort than any other road.

Users' safety Motorways have the lowest accident rates of all types of road (but are less safe than public transport).

Region's prestige Could provide good impression for visiting travellers.

Access for people with reduced mobility No particular impact is expected.

²³ <http://www.highways.gov.uk/foiresponses/FOIresponses/19962.aspx> (last opened 01/02/11)

²⁴ <http://www.spiegel.de/auto/aktuell/0,1518,455939,00.html> (last opened 01/02/11)

²⁵ [http://de.wikipedia.org/wiki/Autobahn_\(Deutschland\)](http://de.wikipedia.org/wiki/Autobahn_(Deutschland)) (last opened 01/02/11)

2.9.5 Other Impacts

A new motorway is likely to induce new traffic and may thus increase GHG emissions (though this effect may be offset if congestion is reduced).

The absence of a high quality road link from an airport to the downtown can give a bad impression to new arrivals – and hence detract from the image of the airport and city.

2.9.6 Examples

The last 10 years have seen new motorway link roads being built to existing airports at Santiago De Compstella airport in Spain, to Oporto airport in Portugal and to Milano Malpensa Airport (new highways to Turin and Milan). At the same time motorway links are also being built to new airports, e.g. Corver in Spain.

2.10 PARK AND RIDE FACILITIES

2.10.1 Description

Car parking and onward public transport services for travellers who wish to continue their journey by public transport. Facilitates combined use of car and public transport – with public transport either being used for the short distance leg (thus avoiding congestion and parking problems in a city) or for the long distance leg (with the car mode being the feeder).

Not simply the provision of parking facilities at interchanges (as per solution 4.1), this solution includes specific provision for the combined mode journey, either through some form of integrated ticket (see solution 6.6) or special arrangements (such as free parking on production of a valid public transport ticket).

If the long-distance leg starts at a port or airport, then the connection between car park and terminal would be considered a shuttle bus (see solution 3.12).

Note that, where the onward bus or train service is the “short” leg, it would not be practicable to reserve the service solely for long-distance travellers alone. Even if it was initially introduced for drivers who had arrived on a long distance motorway, it is likely to become popular with medium distance drivers wanting to access the city from the surrounding region.

2.10.2 Problems Addressed

Difficulties experienced in completing the urban section of a long distance journey by car (e.g. due to congestion or lack of parking space in the urban area) or in completing the final leg of a long distance journey by public transport (e.g. because precise origins and destinations cannot be efficiently served by public transport).

2.10.3 Applicability

Wherever it is appropriate to use car for the first leg of a long public transport journey or to use public transport as the final leg of a long car journey. The former is only really feasible where there is sufficient space for parking.

2.10.4 Performance

Cost This depends in most cases simply on the size of the car park and, whether the service uses a bus and provides a bus shelter. In such cases costs for the first five years will not normally exceed €10 million. However, where a rail line is to be built (or reinstated), or a multi-storey car park is required, the costs escalate very rapidly to much higher.

Technical feasibility No problems.

Financial feasibility Operation of park and ride site and bus service in a good location with high user acceptance has the potential to return a profit. This may not be the case however if the park and ride involves a rail service. Other potential revenue streams may result from rents paid by retailers attracted to the site. This might offset the costs of operation somewhat.

Organisational/legal feasibility There are no organisational problems.

Acceptance by users User acceptance depends mainly on the level of congestion drivers would encounter on their onward journey and, conversely, on the level of public transport priority measures installed en route that would allow the bus to bypass congestion, but, unless installed as a mere political ploy, P&R tends to be well accepted by its users.

Other aspects of political acceptability P&R sites and services tend to be politically popular.

Impact on users' door to door travel time P&R will generally reduce the travel time but the exact amount is dependent upon the level of priority provision.

Impact on users' door to door travel cost P&R may have significant impacts upon total travel cost provided the cost of parking at the final destination is considerably more than that charged at the P&R site.

Initial impact on comfort or convenience Some users would consider a bus or train journey to be much more convenient than driving through a congested city. Those who were put off by the need for an additional interchange, or by any circuitry in the bus route, would presumably choose not to use such a system.

Users' safety Public transport use tends to be safer than car journeys.

Personal security No particular impact is expected.

Access for people with reduced mobility No specific impact.

2.10.5 Other Impacts

No clear implications for mode split and hence congestion or emissions. No other impacts are foreseen.

2.10.6 Examples

There are many examples all over Europe.

2.11 TRAMTRAIN OR TRAINTRAM

2.11.1 Description

Use of a combination of heavy rail track and urban tram track to allow trams to link major interchanges to city centres.

"TramTrain operation involves both track-sharing light rail/heavy rail and dual- or multi-mode operation (Heavy rail voltage / Light rail voltage). The track-sharing sections may also include main line heavy rail infrastructure. Usually infrastructure (tracks and stations) is owned by the railway infrastructure owners (DB Netz, RFF, Prorail, Network Rail etc.) and track access and station use charges apply for the light rail operator. TrainTram-operation is reversing the tram-train idea; direct access from the region to city centres is not achieved by bringing the tramway out onto the railway, but by bringing heavy rail vehicles onto the urban tramway or onto a tramway-like alignment. The heavy rail vehicles being used under urban conditions follow tramway regulations"²⁶.

²⁶ <http://www.lightrail.nl/TramTrain/tramtrain.htm#Definitions> (last opened 01/02/11)

In the rest of this sub section TT is used as a generic term for both systems,

2.11.2 Problems Addressed

Need for interchange between light and heavy rail systems to achieve effective link from interchange to city centre.

2.11.3 Applicability

TramTrain systems will normally be considered where both a heavy and a light rail systems already exist and where high acceptance of public transport use justifies the considerable costs in combining the two.

TrainTram systems are more likely to be considered where there is currently only heavy rail crossing or entering a city and only buses are available within the city. This then provides a chance, in particular where existing rolling stock is anyhow due for renewal to choose replacement trains which are suitable for operation within the city.

In both cases opportunities are best where main railway stations are located not in the actual city centre, so that a necessary change from train to urban transport would apply for most passengers.

2.11.4 Performance

Cost According to HiTRANS²⁷, the costs for a new TT system are very similar to those for new trams (see section 2.7.4).

For the costs of converting an existing tram and train system into TT, no published concrete information was found yet. The two main components that will determine the costs are any differences in gauge, electric system (low vs high voltage) and the need for new vehicles. In the case of Karlsruhe the gauge of tram and train had always been the same so that this aspect has been straightforward; while in the planned system for Braunschweig a three rail system needs to be introduced. The high voltage railway electrics can only be used in urban areas where they can be installed so that there is no danger of accidents for pedestrians or residents. In Chemnitz, this problem was circumvented by using diesel trains.

Technical feasibility The technical problems can be solved.

Financial feasibility As for trams, any new system is highly unlikely to ever pay for itself. The viability of a conversion project depends on the complexity of the conversion and the question whether trams and train in the existing system would be anyhow up for replacement, so that this does not has to count as a direct cost of the conversion.

Organisational/legal feasibility The organisational and regulatory problems were one of the main reasons (other than cost) that so many projects never went beyond the stage of a feasibility study²⁸.

Acceptance by users User acceptance is high.

Other aspects of political acceptability TT links are still rare enough to be regarded as innovative. Their political acceptability is generally high and also the general public tends to welcome TT developments.

Impact on users' door to door travel time There will always be a reduction in travel time and, unless the train services operate with an unusually high frequency, or tram and train arrivals and departures are well coordinated, the average time gain is likely to be more than 10 minutes.

²⁷ HiTRANS (2005) Public transport – mode options and technical solutions. Best practice guide 4. County of Rogaland, Norway

²⁸ <http://www.lightrail.nl/TramTrain/tramtrain.htm#Definitions> (last opened 01/02/11)

Impact on users' door to door travel cost Unlikely to have a major impact.⁰

Initial impact on comfort or convenience If there is no longer a need for an interchange, this would improve the convenience for users.

Users' safety Travel by trams and trains is safer than travel by private car.

Personal security No particular impact is expected.

Access for people with reduced mobility No specific impact – except that, for people with a physical handicap that prevents them from driving a car, an attractive public transport system will improve their access - providing that the system is geared up for their needs. As TT tends to lead to fewer interchanges this will tend to improve accessibility for people with reduced mobility.

2.11.5 Other Impacts

Increased directness will attract some former car users and lead to a mode shift and reduction of congestion and GHG emissions.

TT links from an airport or other major transport interchange to the downtown tend to give a good impression to new arrivals – and hence help project a progressive image for the city concerned.

2.11.6 Examples

The first and still best known system exists in Karlsruhe, but this and many variants of the original system have been introduced for instance in Saarbrücken, Heilbronn, Kassel, Chemnitz and Geneva and a host of further systems are under consideration or already under construction. In Mannheim the Stadtbahnlinie 5, which connects Mannheim with some villages in the countryside and also with Heidelberg, provides a tramtrain link to the airport²⁹.

2.12 GUIDED BUS LINK

2.12.1 Description

Provision of a guided bus link (where the bus is running for all or part of its journey over a special track) between the interchange and the city centre.

The first system used small guide wheels on each side of the bus that could only come into play on special segregated tracks. Newer systems, which general look more like trams than buses, use a guide rail in the middle of its path (TVR). The Dutch Phileas system uses magnets installed in the guideway. The most recent system uses video recognition for a line that is simply painted on the road (CiVis); the special advantage of CiVis is, apart from the low infrastructure requirements, that a vehicle can leave the line if there is an obstacle and rejoin the line immediately behind that. In all cases the driver only has to accelerate and brake while on the special path (with the sole exception of obstacle avoidance with Phileas and CiVis) and can drive the vehicle in a normal way in all other parts of the network.

2.12.2 Problems Addressed

Congestion affecting links between interchange and city centre.

2.12.3 Applicability

For systems with a segregated track, there is the need for sufficient space to allow the building of such a track, and in this case the number and frequency of buses needs to justify the expense. A system with a single guide track at the centre of the vehicle or the Phileas system can be much cheaper to build, because they can operate within the normal road space like many tram systems. Concerning

²⁹ http://flugplatz-mannheim.de/An_und_Abreise.html (last opened 01/02/11)

the infrastructure the French CiVis system would be very cheap, which allows for a very wide applicability in spite of the fact that the on-board equipment for each vehicle is much more expensive than for the other two systems.

2.12.4 Performance

Cost The costs for a bus system with physical guidance lie between €1.6 million and €3.6 million per kilometre.³⁰ On top of that there is a minimum cost of €45,000 per stop with shelter and ticket vending machines, €15,000 to €20,000 for cameras and real-time information, and considerably more if any footbridges are needed. Traffic priority measures would add another €90,000 to €190,000, depending on complexity, and if a new control room is needed, then this adds approximately another €500,000. The costs for each kerb-guided bus are between €500,000 and €800,000, while a TVR bus costs around €1.8 million.

Technical feasibility No problems – provided that there is track room.

Financial feasibility. Given sufficient potential demand, it is expected that a guided bus system could cover its costs.

Organisational/legal feasibility No problems.

Acceptance by users Very high, similar to trams.

Other aspects of political acceptability Guided bus systems tend to be politically popular and are still rare enough to be regarded as innovative.

Impact on users' door to door travel time Guided buses tend to be faster than standard buses due largely to priority ways.

Impact on users' door to door travel cost There is normally no difference in fares to standard buses.

Initial impact on comfort or convenience Due to guidance the ride tends to be smoother and more comfortable.

Users' safety No significant impact although segregation will increase safety.

Personal security No particular impact is expected

Access for people with reduced mobility No specific impact – except that, for people with a physical handicap that prevents them from driving a car, an attractive public transport system will improve their access. In the case of guided bus, the bus stops are usually raised to allow easy access on and off the busses – this is particularly useful for disabled travellers.

2.12.5 Other Impacts

Guided bus may attract some former car users, thereby reducing congestion and GHG emissions.

The first guided bus projects brought some prestige to their regions but this effect is now diminished.

2.12.6 Examples

The first guided bus with side wheels on a segregated track was introduced in Essen, Germany, in 1980 and the guided bus lanes have since been extended there several times³¹. Similar systems can now be found in Adelaide, Leeds, Cambridge and Edinburgh³².

³⁰ HiTRANS (2005) Public transport – mode options and technical solutions. Best practice guide 4. County of Rogaland, Norway.

³¹ http://en.wikipedia.org/wiki/Guided_bus (last opened 01/02/11)

Buses with a central guide rail operate in Nancy, Caen, Clermont-Ferrant and Padua as well as in Shanghai and Tianjin. Phileas operates in the Netherlands and France as well as in Turkey and Korea. CiVis buses operate in Rouen, Las Vegas, Canberra and Brisbane, Australia. Another example is provided by the Castellon hybrid transport demonstration project³³.

An example of a guided bus link that is under construction is an £85 million guided bus route linking Luton and Luton Parkway railway stations with Luton airport. The new busway will run for just over 7 miles from Houghton Regis through Dunstable and on to Luton airport. Work on the scheme began in 2011.³⁴

2.13 SEGREGATED BUS LANES

2.13.1 Description

Provision of segregated lanes for use by buses or coaches travelling to or from the interchange. The use of a network of segregated bus lanes is sometimes known as “bus rapid transit” or BRT.

2.13.2 Problems Addressed

Buses and coaches being delayed by general congestion on the roads.

2.13.3 Applicability

Where space allows the building of a separate bus lane away from general road space, either as a new build or for instance by reassigning and widening a former segregate cycle path.

2.13.4 Performance

Cost The cost is very similar to that for a guided busway: there are no costs for the guide rails on the one side, but on the other the lane has to be wider to allow safe driving.

Technical feasibility No problem.

Financial feasibility Many car drivers who see the bus driving past them at high speed while they are stuck in congestion will consider leaving their car at home and taking the bus, but only in the most optimistic of cases this will be sufficient to eventually pay back for the initial investment.

Organisational/legal feasibility No problems.

Acceptance by users Bus users will always welcome the increased speed and reduced travel time.

Other aspects of political acceptability Bus lanes are popular with some politicians but unpopular with others if the perception of motorists is that the bus lane is underutilised and taking valuable space away from private cars. A segregated lane would also be accepted by car drivers because it does impinge on their road space.

Impact on users' door to door travel time Travel time will tend to be reduced, but why what about is dependent upon the length of the lane and the level of congestion on the adjacent road space.

Impact on users' door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience No specific impact is expected.

³² http://en.wikipedia.org/wiki/List_of_guided_busways_and_BRT_systems_in_the_United_Kingdom (last opened 01/02/11)

³³ <http://www.citymobil-project.eu/site/en/SP1%20Castellon.php> (last opened 01/02/11)

³⁴ <http://www.luton.gov.uk/busway/>

Users' safety Bus use tends to be safer than car use.

Personal security No particular impact is expected.

Access for people with reduced mobility No specific impact – except that, for people with a physical handicap that prevents them from driving a car, an attractive public transport system will improve their access – providing that the system is geared up for their needs.

2.13.5 Other Impacts

A segregated bus lane may attract some former car users, thereby reducing congestion and GHG emissions.

A high quality link from an airport or other major transport interchange to the downtown would give a good impression to new arrivals and help to boost the image of the city in question.

2.13.6 Examples

Numerous examples of segregated bus lanes or “bus ways” exist around the world; Ottawa and Brisbane are particularly well known.

A segregated lane for buses and coaches was provided in the central median of the M4 spur approach to London's Heathrow Airport (from the M4 motorway).

Barcelona has several segregated bus lanes under construction and has plans for one from the airport to downtown (C-31 el Prat)³⁵.

Bus rapid transit is described in a planning guide.³⁶

2.14 IN-ROAD BUS LANES

2.14.1 Description

Provision of dedicated lanes within the normal road space that are, for all or part of the day, only allowed for use by buses and coaches (and perhaps also taxis) travelling to and from the interchange.

2.14.2 Problems Addressed

Buses and coaches being delayed by general congestion on the roads to and from the interchange.

2.14.3 Applicability

Where there are at least two lanes per direction in the road, and where the number of buses per hour justify reducing the road space for cars.

2.14.4 Performance

Cost The costs involved are very low, because they are only consisting of road marking and a series of traffic signs.

Technical feasibility No problems.

³⁵ http://translate.google.com/translate?js=n&prev=t&hl=es&ie=UTF-8&layout=2&eotf=1&sl=ca&tl=en&u=http://xarxamobal.diba.cat/XGMSV/cat/actualitat/actualitat_noticia.asp%3Fcodi%3D30 (last opened 01/02/11)

³⁶ http://www.sutp.org/index.php?option=com_docman&task=cat_view&gid=108&Itemid=54&lang=&Itemid=197 (last opened 01/02/11)

Financial feasibility Since the costs involved are so low, it should be possible in many cases attract a sufficient number of new passengers to achieve sufficient additional income to exceed the costs incurred.

Organisational/legal feasibility No problems.

Acceptance by users Bus lanes are popular with bus users.

Other aspects of political acceptability Bus lanes tend to be popular with some politicians but unpopular with others. Their introduction is often criticised by car drivers who suffer from reduced road space for general traffic. How serious this criticism is depends on the number and frequency of buses on the lanes: the higher they are, the higher is also the general acceptance. In many cases the objections can be overcome by reserving the lane for buses only during peak hours, when their frequency is highest.

Impact on users' door to door travel time The travel time will tend to always be reduced; the extent of the reduction depends upon the length of the lane and the level of congestion that buses had to incur before the existence of the bus lane.

Impact on users' door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience No particular impact is expected.

Users' safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility No specific impact – except that, for people with a physical handicap that prevents them from driving a car, an attractive public transport system will improve their access – providing that the system is geared up for their needs.

2.14.5 Other Impacts

A bus lane may help to attract some former car users, thereby leading to a mode shift and reducing congestion and GHG emissions.

2.14.6 Examples

There are numerous examples in most European cities with particular extensive ones in Edinburgh.. There used to be a bus and taxi lane on the M4 leading from Heathrow airport to central London – although, as of October 2010, the UK government announced that this facility would be removed due to under-use.

2.15 HOV LANES

2.15.1 Description

Provision of dedicated lanes for use by vehicles with a specified minimum number of occupants (typically 2 or 3). Such lanes can be installed on roads leading to or from an airport, rail station or port. They are usually installed in existing road space (by taking up one of the existing lanes) but could, in principle, be built as new lanes.

2.15.2 Problems Addressed

Cars travelling to a port, train station or airport being delayed by general congestion on the roads to and from the interchange.

2.15.3 Applicability

Where there is a congestion problem and space to provide the lane (either making use of an existing lane or with new build – for example in the median or alongside the existing road). Where the lane is to be made by re-designating an existing lane, there needs to be sufficient capacity upstream to cater for the increased queue lengths for general traffic.

2.15.4 Performance

Cost The initial costs can be low if the lane is obtained by re-designating an existing lane (in which case they might comprise not much more than signs and road markings) but could be substantial if a new lane has to be constructed. The main ongoing cost is in monitoring and enforcement by police and surveillance cameras.

Technical feasibility No problems.

Financial feasibility In their usual guise, HOV lanes do not generate any income. However, by designating them as “High Occupancy Toll Lanes” (HOT lanes) a revenue can be generated from drivers of low occupancy vehicles who are prepared to pay to travel in the lane (note, however, that HOT lanes require a higher level of enforcement and that the costs of this might outweigh the revenue).

Organisational/legal feasibility No problems where the necessary legislation exists. An authority wanting to implement them before the necessary legislation is in place could face insurmountable obstacles.

Acceptance by users HOV lanes would be popular with users.

Other aspects of political acceptability HOV lanes are popular with some politicians, but their introduction is often criticised by car drivers who suffer from any reduction in road space for general traffic. How serious this criticism is depends on the number and HOV vehicles actually using the lanes: the higher they are, the higher is also the general acceptance. The objections may therefore be overcome by suspending the HOV lane during off-peak periods.

Impact on users’ door to door travel time The travel time will always be reduced; by what extent depends on the length of the lane and the level of congestion that cars had to incur before the introduction of the HOV lane.

Impact on users’ door to door travel cost No particular impact is expected if travelling in a HOV.

Initial impact on comfort or convenience No particular impact is expected.

Users’ safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility No particular impact is expected.

2.15.5 Other Impacts

None identified – the net impact on GHG would be positive if the HOV lane were to result in less use of single occupancy vehicles but would be negative if it attracted people away from public transport.

2.15.6 Examples

The HOV lanes in the USA are particularly well known. A particularly relevant example is the lane on the main route between Dulles International Airport and downtown Washington DC. The HOT lane concept is also well developed in the USA – with the lanes often labelled as “Value Lanes”.

Most HOV lanes are on motorway-standard roads but the concept can be applied to urban roads – an early example of this in Europe is to be found in Leeds (UK).

2.16 CYCLE PATH

2.16.1 Description

Provision of a cycle path (perhaps shared with pedestrians) linking to the Interchange station, port or airport. The path might be part of the main road marked as cycle path or part of the pedestrian pavement marked as cycle path or a track that is separate from any road. Usefully combined with cycle facilities at the interchange (see solution 4.18).

2.16.2 Problems Addressed

Low uptake of cycling because of the danger associated with cycling on the roads.

2.16.3 Applicability

Very limited since the vast majority of long-distance travellers will have more luggage than can be easily transported by bike. Users will be limited to a small number of long-distance commuters and travellers going on a cycling holiday.

2.16.4 Performance

Cost Costs vary hugely depending on the type of path and length. At one end of the spectrum, if the existing road is wide enough to allow marking out part of it as a cycle path, costs will be minimal. At the other end of the spectrum costs can be quite significant. , according to information on the website of the UK Department of Transport³⁷, a recent 2.4 km long off-road 2 - 3 metre wide cycle path for Sandford Parish Council cost around €40,000 per km, and a 650 metre route in the City of Lincoln even £116,000, i.e. €200,000 per km. However, it is very unlikely that any path would be built for which the costs would exceed €1 million in total.

Technical feasibility No problems.

Financial feasibility As no charges are levied on cyclists using cycle paths they will never cover their costs.

Organisational/legal feasibility No problems.

Acceptance by users Cyclists will have a strong acceptance of cycle paths provided that they follow a direct route and are well maintained and policed.

Other aspects of political acceptability Cycle paths are generally seen by both politicians and the general public as positive developments since they encourage healthy travel and a modal shift away from motorised transport.

Impact on users' door to door travel time For existing cyclists the introduction of cycle paths will tend to reduce their journey time as they will avoid having to share road space with motorised vehicles. For users who switch from motorised vehicles to cycles the change in door to door travel time will depend upon the distance being travelled and the levels of congestion. As a general rule it would be expected that the door to door travel time of new users would rise.

Impact on users' door to door travel cost The cost for existing cyclists would not alter, however for those travellers' who are switching to cycling from other modes there will be a significant reduction in door to door travel costs.

³⁷

<http://webarchive.nationalarchives.gov.uk/+/http://www.dft.gov.uk/pgr/sustainable/cycling/localauthoritycyclinggrantto5734?page=5>

Initial impact on comfort or convenience Existing cyclists will experience greater convenience when travelling along cycle paths as they will not have to manoeuvre around other traffic.

Users' safety Cycling paths will tend to improve safety significantly compared with cycling in mixed traffic.

Personal security Unlikely to have any impact.

Access for people with reduced mobility No impact is expected.

2.16.5 Other Impacts

Cycling is a highly environmental friendly form of transport. Cycle paths are likely to encourage contribution towards a mode shift and so a reduction of congestion and GHG emissions.

2.16.6 Examples

There are many cycle paths in various forms and shapes around Europe, most extensively in The Netherlands and Denmark. Many of these are linked to major rail stations and airports (e.g.. Manchester International Airport cycle route³⁸ and Heathrow Airport cycle routes³⁹). In the case of Heathrow free cycle parking is offered in designated areas at all the terminals with the additional option of storing your bike safely for up to 90 days in the left baggage office.

2.17 IMPROVED MAINTENANCE AND EARLIER REPLACEMENT OF PUBLIC TRANSPORT INFRASTRUCTURE

2.17.1 Description

Improved maintenance of public transport infrastructure linking interchanges with the city centres.

Options might include: an increase in regular maintenance of the rail track, improved signalling, upgraded rolling stock, better maintenance of bus stops etc.

2.17.2 Problems Addressed

Delayed arrival and departure of services, in particular when this impacts upon scheduled connections. Uncomfortable travelling conditions caused by worn out infrastructure.

2.17.3 Applicability

Wherever outdated or poorly maintained infrastructure reduces the performance or attractiveness of public transport links between the interchange and the city centre.

2.17.4 Performance

Cost The additional costs for maintenance depends on the size of step change in the maintenance schedule. The introduction of an improved and more efficient railway signalling system, which could cost billions of euros, whereas upgrading a new bus stop will cost a few thousand euro.

Technical feasibility There are no general problems with the technical feasibility of such improvements as mentioned above.

³⁸ http://www.manchester.gov.uk/info/200102/walking_and_cycling/732/cycling_in_manchester/8 (last opened 1/02/11)

³⁹ http://www.heathrowairport.com/portal/page/Heathrow%5EGeneral%5ETo+and+from+Heathrow%5EBicycles/103a9e9260599110VgnVCM10000036821c0a____/448c6a4c7f1b0010VgnVCM200000357e120a____/ (last opened 1/02/11)

Financial feasibility Improved maintenance may not be financially feasible if it does not generate costs savings or increases in usage that will increase incomes. The payoffs will therefore vary according to what the improved maintenance is targeted at and what the level of improvement it.

Organisational feasibility For most of the solutions it is unlikely that there would be any organisational or legal problems. Clearly this might not be the case for a major maintenance upgrade such as the introduction of a new signalling system which would be a major logistical task.

Acceptance by users Any improvements in maintenance are likely to be welcomed in the long terms by users, however in the short term higher levels of maintenance may be seen as unwelcome if they disrupted travel.

Other aspects of political acceptability If the increase in maintenance leads to improvements in performance then this is likely to be politically acceptable. If no improvements are perceived and the costs are substantial and/or travel is disrupted then political acceptability may not be as strong.

Impact on users' door to door travel time In the long term user's travel times would tend to be reduced if improved maintenance led to a reduction in breakdowns. When averaged across the year, these might be substantial.

Impact on users' door to door travel cost Major improvements and/or more frequent maintenance will need to be financed. If this is not met by the generation of additional traffic then in most cases the additional costs will have to be passed on to the customers via increases in fares.

Initial impact on comfort or convenience Comfort can be enhanced by better maintenance and by the replacement of worn out infrastructure. Convenience is likely to improve as a result of better reliability.

Users' safety If infrastructure is better maintained and upgraded/renewed more often then this is likely to make their operation less accident prone.

Personal security No particular impact is expected.

Region's prestige No particular impact is expected.

Access for people with reduced mobility New infrastructure may provide better access for people with reduced mobility.

2.17.5 Other Impacts

Improved reliability may attract more car users to use public transport. If this was the case this would mean a modal shift and a reduction of congestion and GHG emissions.

Poorly maintained link from key transport hubs to the city centres would give a bad impression to new arrivals to those cities.

2.17.6 Examples

No specific examples needed here.

2.18 VEHICLE OR SERVICE UPGRADE FOR INCREASED COMFORT AND CONVENIENCE

2.18.1 Description

Upgrades of rolling stock or buses on routes to and from interchanges.

The upgrade might encompass a range of improvements, including more room for luggage, more comfortable seating, increased leg space, proper tables for all seats or at least larger fold-down tables from the seat in front, snack and drinks vending machines or - at the top end - even a drinks and snacks table service.

2.18.2 Problems Addressed

Low-quality short-distance public transport is unattractive, particularly to First and Business Class passengers. Buses and carriages that are designed for general purpose or commuter traffic may be unsuitable for interchange passengers (for example, unless specific provision is made for luggage, passengers with large items of luggage will at busy times struggle to access and egress the vehicles).

2.18.3 Applicability

In principle for any service that connects to a long-distance service which is likely to carry passengers – particularly if they are prepared to pay a premium for additional levels of comfort.

This solution is of course very relevant for dedicated shuttle services but could also be applied to trains which serve both the airport and the local community by tailoring the entire train layout to the needs of the long distance travellers or using one part of the train with normal carriages for local traffic and signposting another part with special carriages for the long distance traveller passengers.

2.18.4 Performance

Cost It is not possible to quantify the additional costs in general terms, since this depends entirely on the quality of the existing service and the level of step-change needed.

Technical feasibility No problem.

Financial feasibility High passenger volumes may justify the additional expense - especially where existing vehicles are due for replacement anyhow.

Organisational feasibility No problems.

Acceptance by users Very high.

Other aspects of political acceptability Very high.

Impact on users' door to door travel time None.

Impact on users' door to door travel cost Users' would probably see an increase in the cost of travel in order to pay for this.

Initial impact on comfort or convenience The differences in comfort can be very substantial with a good comparison the Arlanda Express in Stockholm & the Piccadilly line in London!

Users' safety Increased luggage space can improve safety by reducing obstruction of aisles of a bus or train.

Personal security No expected impact.

Access for people with reduced mobility The latest generation of trains and buses include design features which are useful to users with reduced mobility (e.g. low floors, level access, and space for wheel chairs).

2.18.5 Other Impacts

High quality public transport is likely to attract existing car users and thereby affect modal shift - reducing congestion and GHG emissions. It will also improve the image of a city for those people arriving into it.

2.18.6 Examples

As a very simple example, the Heathrow Express and the train to Brussels airport carries both 1st and 2nd class compartments, whereas the Arlanda and Gardermoen Expresses only have one class of travel. However, a single class does not automatically mean low standards; the interior of the Arlanda Express was developed by fashion designers Björn Borg and Stella Valentino and they operate a "surprise patrol that turns up now and then with complimentary buns, coffee or something else equally enjoyable"⁴⁰.

For dedicated airport and passenger port buses it has become wide practise that the bus fleet used is specially designed for carrying luggage. Similar provisions exist in the newer dedicated airport express trains, e.g. the Heathrow, Arlanda, Malpensa or Gardermoen Express.

⁴⁰ <http://www.arlandaexpress.com/textpage.aspx?page=98> (last opened 1/02/11)

3 IMPROVED LOCAL PUBLIC TRANSPORT SERVICES

3.0 INTRODUCTION

This group of solutions concerns improvements to the organisation of local transport services which could be achieved without major investment in new infrastructure (Note, however, that solutions involving improvements to the provision of information are to be found in Section 7 and that those involving ticketing or pricing are to be found in Section 6).

Many of the solutions in this section presuppose a substantial degree of local co-ordination and might require 'enabling' measures such as those described in Section 8 of the toolkit.

Stakeholders thought that Solutions 3.2, 3.5 and 3.7 had particularly high potential to improve interconnectivity and that Solutions 3.2 and 3.7 were likely to yield the highest benefit/cost ratios.

The performance of the solutions is summarised in Table 1.2 and a more detailed description of each solution is presented below.

3.1 INTRODUCTION OF ROBUST SCHEDULES

3.1.1 Description

The introduction of safety margins into the schedule of a service to or from an interchange point will reduce the likelihood that any delays will have knock-on and cumulative effects. Schedules with built-in safety margins can be termed "robust".

3.1.2 Problems Addressed

Delayed services and unreliable schedules are a particular problem for passengers who need to connect with other services.

3.1.3 Applicability

In principle anywhere where current schedules are tight – particularly where delays can build up through knock-on effects – but frequencies are low (schedules are of no great concern to travellers if the frequency is high). The difficult issue is to find the balance between sufficient safety margins on the one side and efficient usage of the system on the other. In the literature there is repeated emphasis that reliability is more important than speed and journey time. Ideally the margins would be created by optimising the schedules to create even gaps in the schedule, but more often this can only be achieved by reducing either average speed on route or increasing the dwelling times at stations, and this in turn may - where the schedules are very dense and tight - only be possible through reducing the number of services that are run.

3.1.4 Performance

Cost If the safety margins mean that that fewer services are run, then this would be even a reduction in operating costs.

Technical feasibility There are no general technical problems with slowing down trains or running fewer services.

Financial feasibility Where the sequence of services is still tight enough and there is sufficient space on the remaining services, so that passengers can and will simply transfer to the remaining services, there will be a substantial net gain through the decrease in operating costs. If there is a loss of fare income, because former passengers use other means of transport instead, then it all depends on the numbers of passengers lost. However, where the schedules are so tight that cancelling a service is the only option for increasing punctuality of the remaining services, the chances are that the cancelled service was also quite busy and, during peak hours, was carrying customers who were paying a premium fare. So there is a strong possibility that there will be a net loss of revenue.

Organisational feasibility Where it is not deemed possible to run fewer services because they are all busy, it is possible that scheduling will not allow trains to slow down or for increased station dwelling times.

Acceptance by users Users will always welcome more reliable services, but this may be tempered if the implication is slower and fewer services.

Other aspects of political acceptability More reliable train services will to be welcomed by politicians provided the impact of slower and fewer services is overcome.

Impact on users' door to door travel time This is likely to increase, but depends upon the frequency and length of current delays being experienced.

Impact on users' door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience Reliability improves convenience and reduces the stress experienced whilst travelling. Studies have shown that this will more than compensate for any loss in speed^{41 42}.

Users' safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility No particular impact is expected.

3.1.5 Other Impacts

If the increased reliability leads to a modal transfer away from car then this could contribute to a reduction in congestion and GHG emissions. A more reliable service will also tend to lead to better first impressions for new arrivals to a city.

3.1.6 Examples

The UK rail system has three variants of robust scheduling built into its timetabling. The first is the addition of performance time (commonly referred to as diamond time) to train schedules. This is a number of additional minutes which are used to counter any minor non-specific performance problems on route and is normally inserted into the approach to a key node, i.e. East Coast line services will have a 2 minute performance time built into the approach to Kings Cross station. The second example is the use of extended dwell times at intermediate nodes. This is to enable late running times to regain time and helps prevent transmission of delays to other services. Thirdly, there is the use of Public Time differential. This is where the planned arrival or departure time differs from the advertised one, i.e. a 1500 arrival at a terminating station may actually be planned to arrive at 14.58.

3.2 INTEGRATED TIMETABLING

3.2.1 Description

System-wide integrated timetabling based on clear and consistent rules, such as *Taktfahrplan* implemented on Swiss Railways since 1982. A *Taktfahrplan* is a top-down exercise and involves all services in the network. It is said to rest on six characteristics:

1. The methodology delivers a coherent timetable across a network;
2. It articulates a well-defined hierarchy of services;
3. Connectivity for a journey on any relation (place-pair) is optimised;

⁴¹ Wissenschaftlicher Beirat des Bundesministers für Verkehr, Bau und Stadtentwicklung; *Zuverlässigkeit der Verkehrssysteme - Teil 2*; Straßenverkehrstechnik 2/2009

⁴² <http://etcproceedings.org/paper/rail-access-to-airports-how-important-is-dedication> (last opened 1/02/11)

4. Systematic planning and regularity together make the best use of capacity;
5. A repeating pattern is simple to market and memorable for customers; and
6. The service in one direction is the mirror-image of that in the reverse direction.

Integrated timetabling is distinct from 'hubbing' which occurs in the airline industry (see Solution 3.4). It is also distinct from regular interval (or 'clockface') timetabling (see Solution 3.3), in that it is more extensive than simply regularising the timing of services.

3.2.2 Problems Addressed

This sort of 'clean-sheet' approach to generating a timetable can be particularly beneficial to interconnecting travellers. It seeks to address a number of problems simultaneously. Firstly, it seeks to optimise point to point journey times and interchange opportunities for passengers, to make best use of infrastructure and to provide simplicity in the presentation of the timetable to the passenger. In so doing, it avoids loss of network benefits, under-utilization of assets and presentation of complex or confusing information to the passenger.

It is worth noting that ideally this would be applied across all modes so that interconnection occurs between them at an appropriate and in a timely manner. The latter needs to be emphasised since whilst it is important to have a connection between airports and rail it is even more important to ensure that those connections are timely - i.e. that the train arrives at the airport in time for the passenger to catch his or her flight.

3.2.3 Applicability

When it is deemed important to provide a network of interconnecting transport services (not so relevant where the focus is exclusively on point-to-point journeys).

3.2.4 Performance

Cost Costs would principally be associated with the costs of planning, and would be expected to be less than €1m.

Technical feasibility In complex networks technical feasibility is not straight forward, but it has been demonstrated that difficulties can be soluble.

Financial feasibility There is no evidence that this will pose a significant problem.

Organisational feasibility This may pose some significant difficulties, especially where there is more than one operator involved.

Acceptance by users Except for some natural resistance to change, it is expected that this would be welcomed by users.

Other aspects of political acceptability If this leads to a perceived improvement in the performance of the train service then political acceptability is likely to be high.

Impact on users' door to door travel time Difficult to assess as there are likely to be some 'winners' and some 'losers'.

Impact on users' door to door travel cost No direct impact.

Initial impact on comfort or convenience Improved as a result of better reliability

Users' safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility No particular impact is expected.

3.2.5 Other Impacts

If the change attracts users who would otherwise have travelled by car or taxi, the resulting modal shift will reduce GHG emissions and, perhaps also congestion. In addition, good integration of services from a port of entry with other services gives a favourable impression to new arrivals and hence helps to boost the image of the region.

3.2.6 Examples

Swiss Railways.

3.3 REGULAR INTERVAL TIMETABLING

3.3.1 Description

Timetabling such that the interval between services – the headway - running in one direction is a constant number of minutes. The interval will depend on the demand level and the unit capacity of the vehicle/vessel/train. It is distinct from ‘hubbing’ which occurs in the airline industry (see Solution 3.4) and from fully integrated timetabling (see Solution 3.2) in that it is a less extensive undertaking, tending toward modification of existing schedules rather than a route and branch, ‘clean-sheet’ review of previous practice.

3.3.2 Problems Addressed

The attraction is that a repeating pattern is simple to market and more memorable for customers than a non repeating pattern.

3.3.3 Applicability

All scheduled transport users can benefit but an easily memorised timetable will be particularly valuable for infrequent travellers.

3.3.4 Performance

Cost Costs would principally be associated with the costs of planning, and would be expected to be less than €1m.

Technical feasibility In complex networks technical feasibility could pose some difficulties, but these have been demonstrated to be soluble.

Financial feasibility There is no evidence that this will pose a significant problem.

Organisational feasibility This may pose some difficulties, especially where there is more than one operator involved.

Acceptance by users Except for some natural resistance to change, it is expected that this would be welcomed by users.

Other aspects of political acceptability If this leads to a perceived improvement in the performance of the train service then political acceptability is likely to be high.

Impact on users’ door to door travel time For some there would be improvements, but for some, regularisation of schedules may mean longer journey times.

Impact on users’ door to door travel cost No direct impact.

Initial impact on comfort or convenience Again, for some there will be improvements but for others convenience may be decreased, e.g. via longer wait times.

Users' safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility No particular impact is expected.

3.3.5 Other Impacts

If the change attracts users who would otherwise have travelled by car or taxi, the resulting modal shift will reduce GHG emissions and, perhaps also congestion.

3.3.6 Examples

Many metro, urban and public transport lines run on a regular interval timetable. Regular interval timetabling is the norm for airport shuttle services. The Malpensa Express trains connecting Malpensa Airport with Milan is one example. Merseyrail's links to John Lennon Airport is another.

3.4 CREATING HUB-AND-SPOKE SCHEDULES BY ADDING SHORT 'SPOKES'

3.4.1 Description

Effective hubbing requires that services from different locations arrive at the hub at approximately the same time and, after waiting to allow the interchange of passengers and baggage, then depart in quick succession back along the spokes. This process - a wave of arrivals quickly followed by a wave of departures - is described as a '*complex*' (an airline with a major hub will operate several *complexes* during the day, e.g. Air France operate six per day at Paris CDG). Since changes to the 'long' leg of a journey are beyond the scope of the INTERCONNECT project, we deal here only with adding short 'spokes' to create a new hub or to enhance an existing one. Solutions 3.2 and 3.3 have dealt with changes which can be achieved simply by re-scheduling or re-timetabling. We deal here with the provision of new routes and services.

3.4.2 Problems Addressed

To provide greater connectivity to a greater number of destinations. In fact, the increase in city pair coverage that can be attained by hubbing is more dramatic than is often realised - if three point to point direct links from cities A to B, C to D and E to F are replaced by six direct services from each of the six airports to a new hub at an inter-mediary point, the number of city pair markets that can be served jumps from three to twenty-one. The relationship is given by the following equation:

$$\text{Total city-pairs served} = N + (N(N-1)/2) \quad - \text{Where } N \text{ is the number of spokes from the hub.}$$

3.4.3 Applicability

When it is desirable to provide a network of transport services and a single operator (or regulator) has control over the provision and scheduling of services from a potential hub. Hub and spoke scheduling can apply to any modes. INTERCONNECT is only concerned with feeder services which are shorter than about 100kms, but, in practice, airline feeders will often be rather longer than that.

3.4.4 Performance

Cost Costs would principally be associated with the costs of planning, and would be expected to be less than €1m.

Technical feasibility Technical feasibility is not straightforward, but difficulties have been demonstrated to be soluble.

Financial feasibility There is no evidence that this will pose a significant problem.

Organisational feasibility There is no evidence that this poses significant difficulties.

Acceptance by users For those who previously used point-to-point services that would be replaced by an interconnecting journey via the hub there would be expected to be resistance, but other users seeking to access a number of different destinations that would be served via the hub would be expected to welcome the change.

Other aspects of political acceptability There is no evidence that this would pose problems.

Impact on users' door to door travel time On balance, time is likely to be decreased.

Impact on users' door to door travel cost Variable.

Initial impact on comfort or convenience Increased.

Users' safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility No particular impact is expected.

3.4.5 Other Impacts

The principal impact is to increase, potentially dramatically, the number of destinations conveniently available. If this attracts users who would otherwise have travelled by car or taxi, the resulting modal shift will reduce GHG emissions and, perhaps also congestion.

The profile of the hub would be expected to be raised, as it becomes the focus for transport operations in that region.

3.4.6 Examples

European and US airlines, post liberalisation and deregulation.

3.5 INCREASED SERVICE FREQUENCY OR CAPACITY

3.5.1 Description

Increasing the frequency or capacity of any bus, tram, train, ferry or air service which provides the "local" connection in a long distance journey.

3.5.2 Problems Addressed

Long waiting times between services and/or overcrowding of existing services.

3.5.3 Applicability

When waiting times are long and expected passenger numbers justify the increased level of service.

3.5.4 Performance

Cost The costs entirely depend on type of service and therefore both the operational costs of the service and the question whether increasing the frequency or capacity will require the acquisition of additional vehicles, extension of platforms, re-signalling, etc. If, for instance an additional HSR train is needed, then the five year cost would certainly exceed the €10m threshold.

Technical feasibility Technical problems are unlikely unless the desired frequency exceeds what can be safely achieved (below this limit, higher frequencies may require advanced signalling but are not unachievable).

Financial feasibility This depends on the type of service and the need for additional vehicles or infrastructure.

Organisational feasibility There would be no problems with bus services, but on busy train lines it is very possible that an additional service cannot be fitted into the existing schedule.

Acceptance by users Acceptance by users would be very high.

Other aspects of political acceptability Political acceptance is likely to be high providing the accompanying increase in costs is not too high.

Impact on users' door to door travel time Higher frequency will lead to shorter average waiting times. This can be substantial where the existing frequency is low.

Impact on users' door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience More frequent services improve the convenience of travel by reducing waiting time. Where additional services are delivered to reduce overcrowding in existing services, this will also significantly increase travel comfort.

Users' safety No specific impact - except when the previous system had dangerous levels of overcrowding.

Personal security No particular impact is expected.

Access for people with reduced mobility Some improvement due to reduced crowding and waiting times.

3.5.5 Other Impacts

Higher frequency is likely to lead to modal shift from car to rail and as such result in a reduction of congestion and GHG emissions.

3.5.6 Examples

Currently the rail services connecting Barcelona with its airport is seen as too infrequent, instead bus or taxi is often seen as a better option.

3.6 SERVICE RE-ROUTING

3.6.1 Description

Changing the routing of services to decrease the number of interchanges needed between the interchange and the city centre.

3.6.2 Problems Addressed

Delay and inconvenience associated with unnecessary intermodal transfers.

3.6.3 Applicability

When there is a significant demand for trips but no direct service and when there is another, less important, service which could be re-routed to provide the direct service (for example, if the airport can be reached from point A only by taking a bus heading for point B and changing onto another bus at

intermediate point X. The airport journey would be easier if the bus ran from point A to the airport – with passengers wanting to go to B interchanging at X).

This solution is particularly relevant for bus routes since tram, metro and train lines offer fewer opportunities to re-route due to the fixed nature of their infrastructure.

3.6.4 Performance

Cost Apart from printing and publishing new timetables, the cost could be minimal.

Technical feasibility No problems.

Financial feasibility No problems – if the demand is there.

Organisational feasibility No problems.

Acceptance by users Although, in the example quoted, users of the former direct service would be disadvantaged, airport-bound passengers would benefit. Clearly there will be some winners and some winners and some losers.

Other aspects of political acceptability Potential problems depending upon the net result from the winners and losers perspective.

Impact on users' door to door travel time Clearly there will be some winners and losers.

Impact on users' door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience Clearly there will be some winners and some losers.

Users' safety No specific impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility The need to negotiate fewer interchanges increases accessibility for people with reduced mobility. Clearly however, there will be winners and losers.

3.6.5 Other Impacts

Increased directness will attract some former car users but existing bus users may be divert away from bus to car as a result of reduced access to local destinations. The net effect on congestion and GHG emissions is therefore unclear.

3.6.6 Examples

TfL proposes a number of simplifications to bus services in Harrow town centre including services to Heathrow Airport. The key reasons for the proposed changes were: (1) Simpler bus services: buses would use the same roads in both directions, making services easier to understand – especially for passengers unfamiliar with the local network; (2) Shorter walking distance between Station Road shops and bus services: southbound passengers would no longer need to walk to and from stops N and P on Greenhill Way; (3) Quicker bus journeys: rerouting buses along Station Road rather than Greenhill Way will cut an average of 1.4 minutes from journey times. Rerouting buses along Gayton Road will cut an average of 1 minute from journey times; and (4) Lower operating costs: the shorter journey lengths and times will reduce operating costs, saving public money⁴³.

⁴³https://consultations.tfl.gov.uk/consultation-and-engagement/harrow-town-centre/supporting_documents/Harrowbuservicesleaflet.pdf (last opened 1/02/2011)

3.7 DIRECT (SHUTTLE OR EXPRESS) SERVICES BY RAIL OR BUS

3.7.1 Description

Provision of direct bus or train services between the port or airport and major destinations – typically the downtown. (see also Solutions 3.8 and 3.12).

3.7.2 Problems Addressed

Slow connection to downtown due to absence of a direct public transport link or due to there being many stops en route.

3.7.3 Applicability

An express bus shuttle can be introduced where no direct link exists. An existing bus or train service could be converted into an express service by the removal of intermediate stops provided that, if any of the deleted stops are important, they are still served by other services (and, in the case of rail, that the express service can overtake the slower services – note that this is rarely possible in the case of tram or metro services).

3.7.4 Performance

Cost Where a new service is provided – particularly if it is by rail, the costs can be significant. Where an existing service is converted, there could be some loss of revenue from passengers who would have used the interim stops that have been left out (however, if stopping services on that line are frequent, such passengers are likely to simply transfer to the stopping service).

Technical feasibility For buses there are no problems at all. For rail-based services the main precondition is that it is possible to allow the express services to overtake slower trains.

Financial feasibility Where the new service attracts new passengers, there is the possibility that this measure may generate a profit.

Organisational feasibility For buses there are no problems at all. For trains that need to use, at least in part, a busy mainline there is the potential problem that the scheduling does not have provision for slotting in faster trains and the accompanying overtaking manoeuvres.

Acceptance by users New services will be welcomed. Where an existing service is converted by removing intermediate stops, people who used the now missing stops will not welcome the change. However, if stops are only removed where there was only a relatively small number of travellers benefiting from the stop, overall acceptance should be given.

Other aspects of political acceptability No problems are envisaged except that, where an existing service has been converted by removal of intermediate stops, and if alternative services are not provided, the communities whose access is thus reduced may be expected to object.

Impact on users' door to door travel time The new services will be always faster; the extent of the improvement will depend upon the number of stops left out. On the other hand, travellers who can now no longer use the interim stops may incur significantly longer travel times.

Impact on users' door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience Increased speed increases the convenience of the service (again, those who wanted to use the discontinued stops will be inconvenienced).

Users' safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility Those wanting to use the discontinued stops will be inconvenienced.

3.7.5 Other Impacts

If the faster service attracts former car travellers, the resulting modal shift would help reduce congestion and GHG emissions (but this would be off-set by any reduced use by users who are off-put by the reduced number of local stops).

3.7.6 Examples

Direct shuttle services exist to and from most major airports. Many of these were introduced as express services right from the outset. However, there are several examples around Europe where pre-existing bus or train services were converted to express services by omitting some stops or stations. Highlighting a few examples is essentially random but one specially relevant to airports is the express services on the Karlsruhe-Bretten tramtrain line.

Regional bus links operate out of Dublin airports. Similarly express coach links operate to all the major UK airports from key regional cities in the UK.

3.8 ADDITION OF INTERMEDIATE STOPS

3.8.1 Description

Addition of new stops on an existing service (but see also Solution 3.7).

3.8.2 Problems Addressed

Poor interconnectivity to areas en route between the interchange point and the city centre.

3.8.3 Applicability

Where there is a sufficient demand for the intermediate stops and the addition of new stops does not unduly increase the travel time for the end-to-end passengers. (the impact on end-to-end journey times may be reduced by appropriate designation of the intermediate stops. For example, in the case of a service from an airport to a city centre, the service might stop at intermediate points only for disembarking passengers).

3.8.4 Performance

Cost As long as existing stations can be used that were so far omitted by the current service, there are no serious cost implications.

Technical feasibility There are no technical problems.

Financial feasibility Additional passengers could facilitate additional stops through improved revenue streams.

Organisational feasibility Depending on the other traffic on the same line, it may be possible that it is difficult to accommodate the additional stops in a tight schedule.

Acceptance by users Those using the additional stops will welcome the change, while those who would prefer a faster service will not. Clearly there will be winners and losers.

Other aspects of political acceptability No problems – unless journey times become excessive or a “no alighting” rule was deemed controversial.

Impact on users' door to door travel time There will be a small increase for those travelling through the new stop, but the time gain for those using it, can be substantial. Clearly there would be winners and losers.

Impact on users' door to door travel cost No major impact.

Initial impact on comfort or convenience The increased travel time will reduce the convenience for the existing travellers a little, but the opportunity to do the interchange at a significantly more convenient location may have some substantial benefits for travellers.

Users' safety No significant impact expected.

Personal security No significant impact.

Access for people with reduced mobility The possibility to use a more convenient, and possibly more familiar, interchange may increase accessibility for people with reduced mobility.

3.8.5 Other Impacts

If the additional stops attract former car users, then this could contribute to a reduction of congestion and GHG emissions. Clearly, additional stops may also result in existing passengers shifting to car which would negate any reduction in congestion and emissions.

3.8.6 Examples

There are many examples around Europe; One of the more prominent ones is the **Stansted Express** where it was decided that the express train to Liverpool Street should have alternating and intermediate stops either at Bishop's Stortford or Harlow Town, and so serve both the region and the airport. **Heathrow Connect** is a stopping rail service from London to Heathrow Airport.

3.9 DEMAND-RESPONSIVE BUS SERVICE

3.9.1 Description

A small bus with flexible routeing, which only picks and sets down passengers at bus stops for which there is actual demand; sometimes even providing a door-to-door service. Such a service can collect all passengers at an airport, port or railway station at given times or intervals and then optimises the routing to get all passengers to their destinations. On the return e.g. passengers need to phone a call centre or use the internet in advance to arrange pick up at a certain time and location.

3.9.2 Problems Addressed

Buses running empty on routes for which there is low (but non-zero) demand. Absence of public transport on routes for which there is a small but significant demand.

3.9.3 Applicability

Demand-responsive buses can be appropriate where demand for public transport exists, but passenger numbers are not sufficiently concentrated to sustain a regular fixed-route service. It can be particularly applicable for off peak periods.

3.9.4 Performance

Cost The costs to run a service are higher than those for a scheduled bus in so far as there is the need for a call centre and the route optimisation software. However, the call centre will not normally require a dedicated member of staff. Instead it can be operated by somebody who has other duties in parallel, hence minimising the costs.

Technical feasibility No problems.

Financial feasibility Both passenger numbers and fares would be somewhere between those for buses and taxis, and if the right balance between them can be found, then it should be possible to run this service as a profitable business.

The “Edinburgh Shuttle” that ran between Edinburgh airport and the city centre, was such a service and operated for three years. The original business case suggested that, in the long term, it could be profitable. Passenger numbers peaked in late 2008, however, with the economic down-turn leading to a dip in air passenger numbers, and no prospects of growth reaching the original forecasts again in the short-term, the operator, Lothian Buses, had to focus on their core business, i.e. the regular mainstream bus operations. It was decided in April 2009 to discontinue the service - much to the regret of both Lothian Buses and BAA, the airport operator.

Organisational feasibility No serious organisational problems.

Acceptance by users The user acceptance is very high.

Other aspects of political acceptability There are no political problems.

Impact on users’ door to door travel time Due to rather convoluted routes, travel times will, on average be longer than those by car, unless the bus can benefit from extensive priority measures in an otherwise congested city.

Impact on users’ door to door travel cost Fares will be lower than those of a taxi (or the use of a car by a single driver).

Initial impact on comfort or convenience Where operated as a true door-to-door service and not just a pick-up from the nearest regular bus stop, a demand-responsive service is nearly as convenient as a taxi service.

Users’ safety No significant impact.

Personal security No particular issues.

Access for people with reduced mobility When operated as a door-to-door service, it will improve access for people with reduced mobility.

3.9.5 Other Impacts

Demand-responsive services are likely to attract former car users and thereby reduce road congestion and GHG emissions.

3.9.6 Examples

Edinburgh had a shuttle for door-to-door transport between the airport and any destination in Edinburgh, which folded after three years. Currently, various door-to-door services run between London Stansted airport and various towns in Essex. In Belgium, De Lijn operates a large number of demand-responsive feeder services.

3.10 PROVISION OF DEDICATED SHARED-RIDE TAXI SERVICES

3.10.1 Description.

Provision of a dedicated local taxi service for passengers making long distance trips by rail, or coach that can be shared with other passengers. Tickets for such services might be included as an add-on to the long distance journey.

3.10.2 Problems Addressed

Improves accessibility from poorly connected areas.

3.10.3 Applicability

Applicable on routes where there is no convenient or commercially viable access by public transport to major interconnection points. Only relevant if private taxi companies are not able or willing to provide attractive services (e.g. because they see no prospect of a profit or because, although the service could be commercially sustainable, local regulations forbid shared taxis). May be appropriate during off-peak periods when demand is insufficient to justify conventional public transport.

3.10.4 Performance

Cost The cost of taxi vehicles, employment of drivers and setup of a call centre could be significant but may be avoided if agreement can be reached with an existing taxi company who might extend their existing services to provide this new service. Costs could be reduced by offering the service only in areas where demand is sufficient. (e.g. in Vienna, the CAT-CAB service is only available for addresses within Vienna).

Technical feasibility No serious obstacles (though a booking system might be needed to ensure availability of sufficient taxis as and when they are required).

Financial feasibility A subsidy from the long distance operator might be justified if it is believed that the new taxi service will generate additional demand for long distance travel (particularly during off-peak periods when public transport cannot be justified). However, as noted above, the service might be financially viable without any subsidy.

Organisational feasibility Needs either cooperative agreements between rail/airport/coach operator and private taxi companies or dedicated taxi service provided by rail/airport/coach operator. In some cases, the benefits of a dedicated low cost taxi service might be achieved simply by changing local regulations which might be preventing local taxi companies from offering this service on a commercial basis (e.g. if regulations forbid the offer of shared taxi services).

Acceptance by users Very high if the overall price for the ticket is reasonable.

Other aspects of political acceptability No particular issues.

Impact on users' door to door travel time Depending on the mode replaced by the taxi leg there could be substantial time savings due to the directness of the route and the avoidance of in-journey stops as characteristic of public transport.

Impact on users' door to door travel cost Depending on the mode replaced by the taxi leg there could be an increase in cost for user because taxi services tend to be higher priced than public city transport (in Vienna, a one-way combined airport rail and taxi ticket costs 24 EUR for Zone 1 and 28 EUR for Zone 2, while train only ticket costs 9 EUR). However, a shared taxi will be cheaper than a conventional taxi.

Initial impact on comfort or convenience Positive – taxi services are more comfortable than a complex public transport journey.

Users' safety No significant impact

Personal security Some improvement might be expected relative to use of circuitous public transport with numerous changes – particularly at night time.

Access for people with reduced mobility This is likely to be improved as the taxi option is more friendly for disabled people than conventional public transport.

3.10.5 Other Impacts

None identified but there is likely to be an adverse environmental impact as a result of taxi journeys replacing public transport journeys.

3.10.6 Examples

One example of this is the Taxi-share⁴⁴ scheme operated out of Paddington Railway station by Heathrow express train operating company. During peak periods (weekday mornings between 8.30 and 10am) there simply are not enough taxis to quickly meet customer demand at Paddington. The scheme helps more people to depart more quickly, at a reduced fare, to central London destinations by implementing a taxi-share scheme by which travellers who are heading to similar destinations (there is a zonal system to help facilitate this) volunteer to share a taxi ride with other passengers. Heathrow Express employs taxi marshals (members of the Licensed Taxi Drivers Association) to organise sharers into groups. To take part passengers must collect a destination zone voucher from a Share Marshal which enables them to go to 3 priority loading bays where they are then directed into a taxi with other sharers.

In Vienna the CAT-CAB system involves the City Airport Train which takes passenger on a non-stop journey from the heart of Vienna to the airport in only 16 minutes. Access to the train terminal is provided by taxis provided by the same operator⁴⁵.

Cooperative agreements between taxi and rail/airport companies can result in reduced taxi fares. For example, "train taxi" from Holland provides economical and comfortable transport to and from the station. Because the taxi is shared with other passengers, the fare is less than a regular taxi without sacrificing the comfort. Train taxis are available at thirty six stations throughout The Netherlands, their schedules have been designed to coincide with the train schedules.

Other existing examples (Sweden, The Netherlands) are pure DRT solutions with taxi perceived as replacement of other public services. Swedish studies however perceives a future role for those taxi services as possible replacements for long distance bus/rail services in sparsely populated areas as well as ways to access long distance rail/air modes⁴⁶.

3.11 LINK INTO GENERAL BUS LINES

3.11.1 Description

Linking the airport, port or train terminal into existing bus lines by rerouting the bus to a new stop at the terminal.

3.11.2 Problems Addressed

Lack of access to local public transport.

3.11.3 Applicability

Where bus routes to important destinations run in close proximity past the terminal.

3.11.4 Performance

Cost The costs for the re-routing are minimal, comprising the extra time for the driver, small additional bus operating costs and possibly the costs for a new bus stop.

Technical feasibility No problems.

⁴⁴ <http://www.heathrowexpress.com/taxi-share> (last opened 1/02/11)

⁴⁵ <http://www.cityairporttrain.com/> (last opened 1/02/11)

⁴⁶ Börjesson, M ; Slutredovisning av FINAL-projektet. Fullständig integrering av anropsstyrd trafik och linjetrafik. www.port.se/final (last opened 1/02/11)

Financial feasibility There could be additional income from new passengers, but also losses for current users who would be deterred by the additional travel time.

Organisational feasibility No problems.

Acceptance by users Acceptance by the new users can be assumed, but acceptance by the existing users will be the lower the longer the detour takes.

Other aspects of political acceptability No anticipated problems

Impact on users' door to door travel time There will be an increase for existing users, while for new users the bus trip may be shorter or longer than a car journey.

Impact on users' door to door travel cost The use of the bus will normally be cheaper than the use of the car.

Initial impact on comfort or convenience More convenient for those who have to use public transport.

Users' safety No specific impact.

Personal security No particular impact is expected.

Access for people with reduced mobility Direct access to a public transport link will help access for those with reduced mobility.

3.11.5 Other Impacts

The access to buses enables the use of public transport for some travellers and may therefore attract some former car users, thereby reduce road congestion and GHG emissions.

3.11.6 Examples

There are several good Rail-Bus interchanges in Stockholm (e.g. at the Gullmarsplan T-banna station). Possibilities for this kind of interchange are currently under review for Edinburgh airport.

3.12 SHUTTLE BUS LINKS BETWEEN DIFFERENT INTERCHANGE POINTS

3.12.1 Description

Linking the terminal or stop of one transport mode to a terminal or nearest station / stop of another mode via a bus shuttle service.

3.12.2 Problems Addressed

Inadequate linkage between adjacent stops and terminals.

3.12.3 Applicability

Where a terminal or stop of one mode is in close proximity to that of another mode.

3.12.4 Performance

Cost The only infrastructure needed is a stop for the shuttle service, so in this case the only costs are those for a bus, the driver and the running costs of the bus.

Technical feasibility There are no technical problems.

Financial feasibility In many cases shuttles are run free of charge (e.g. the shuttle between the railway station and the air terminal at Frankfurt/Main airport is offered free because it is assumed that the non financial benefits of the service are substantial.. Others charge a fare (e.g. at London Luton airport the bus fare is £1 per direction for rail users and £1.50 for users arriving at the train station by car. Whether this is sufficient to generate a profit from the shuttle operation is not in the public domain. A shuttle service could generate additional revenues to the airport if it attracts additional passengers to this airport instead of others.

Organisational feasibility There are no organisational problems.

Acceptance by users Shuttle buses are generally liked by their users.

Other aspects of political acceptability There are no political problems and, when “minor” interchange points are linked to major ones, the representatives of the minor locations will tend to be very enthusiastic.

Impact on users’ door to door travel time In this case, unless the shuttle bus only covers a distance that could be easily managed on foot, the comparison has to be made with a car/taxi trip. As such it is unlikely to result in any time savings.

Impact on users’ door to door travel cost A car trip, if made by a single vehicle occupant, is likely to be more expensive than the use of public transport.

Initial impact on comfort or convenience The shuttle makes the access to public transport more convenient.

Users’ safety Bus use is safer than car use – and certainly safer than trying to walk between terminals.

Personal security No particular impact.

Access for people with reduced mobility Positive impact providing that the shuttle service is accessible.

3.12.5 Other Impacts

The shuttle bus service enables the use of public transport and may possibly attract car users out of their cars; thus reducing road congestion and GHG emissions.

3.12.6 Examples

There are numerous examples: the shuttle bus between Luton airport and Luton Parkway station; the **Railair** bus link between Heathrow and Reading; the **Airline** coach service linking Heathrow with Oxford; and Oslo airport’s **Flytoget** and **Flybussen** links (train and bus respectively).

3.13 PROVISION OF SHORT FEEDER FLIGHTS

3.13.1 Description

Introduction of short, low capacity, feeder flights from areas that are currently only accessible to an international airport only with tortuous and time consuming journeys by land or sea. Strictly speaking, given the scope of INTERCONNECT, we are concerned here only with feeder flights of up to about 100 kms but, in practice, some might be rather longer.

3.13.2 Problems Addressed

Lack of accessibility from and to areas with poor access by land or sea.

3.13.3 Applicability

Where communities are currently only accessible with car journeys of four hours or more and are sufficiently large to support at the very least one weekly flight. Examples might include offshore islands and other isolated communities with no good quality road links.

3.13.4 Performance

Cost In most cases, a landing strip will need to be built (an exception is for instance Barra airport in Scotland, which uses the beach as landing strip) and maintained. The ongoing costs for the hire of aircraft and crew will depend on the size of the aircraft and frequency of the service but could start at around €2,000 for a return flight. Therefore even the introduction of only one weekly flight will cost at the very least €500,000 over five years, even where no landing strip needs to be built.

Technical feasibility A landing strip for a small aircraft can be built practically anywhere.

Financial feasibility Operations for very small passenger numbers are likely to need subsidies (e.g. under Public Service Obligations - PSOs). Operations from about 10 passengers upwards can be self-financing, but the fares would need to be higher the lower the passenger numbers are. Around €150 is being charged for a return flight on the 230 km long PSO route between Glasgow and Barra on an aircraft for 18 passengers – this is not financially viable. It should be noted, however, that these flights are unlikely to serve only as feeder flights, many of the potential passengers would have the town which houses the international airport, as their final destination. These “additional” passengers would, of course, contribute to the revenue.

Organisational feasibility No problems foreseen.

Acceptance by users Depends on price.

Other aspects of political acceptability Environmental concerns might be raised – although the carbon footprint of a fully loaded small aircraft lies in the same order of magnitude as the equivalent car journey that would be undertaken by all its passengers. Representatives of the communities linked to the major airports will tend to be enthusiastic.

Impact on users' door to door travel time The time saving will generally be very significant and can amount to several hours.

Impact on users' door to door travel cost This depends entirely on the airfare and the number of passengers per car. Assuming a running cost of 40 cent per kilometre for an average car, a 230 km round trip would cost €184, which is higher than the airfare quoted for Glasgow-Barra above. However, if more than one person travels in one car, or if luggage also needs to be transported, the costs per passenger would be much lower than for the flights.

Initial impact on comfort or convenience A short flight is clearly much more convenient and comfortable than a long car journey.

Users' safety Flying is generally safer than driving by car. Flying small aircraft, of course, carries a greater accident risk than large commercial ones, but equally driving on what are likely to be narrow, winding and relatively poorly maintained country roads constitutes an above average risk.

Personal security A car break-down in a remote area can be a substantial security risk, so feeder flights would improve personal security considerably.

Access for people with reduced mobility Will make a considerable difference for people who find long journeys physically tiring.

3.13.5 Other Impacts

Compared to the situation ex-ante, the provision of feeder flights is likely to increase the perceived accessibility of the “remote” region concerned. Increased accessibility could increase trip numbers as well as increasing employment opportunities for people living in remote areas.

Since the carbon footprint of a fully loaded small aircraft lies in the same order of magnitude as the equivalent from car journeys of all its passengers, no significant effect on GHG is envisaged but, if the aircraft is not fully loaded or net effect is to increase trip numbers, some increase in GHG would occur.

3.13.6 Examples

There are many examples in the less populated regions of Europe, for instance flights from Glasgow and Edinburgh to Campbeltown, Islay, Tiree, Barra, Benbecula, Kirkwall and Wick, or in Finland flights from Tampere to about 20 small location destinations. A useful overview of all PSO routes within the EU has been produced⁴⁷.

⁴⁷ http://ec.europa.eu/transport/air/internal_market/doc/2009_11_03_pso_inventory.pdf (last opened 1/02/11)

4 IMPROVEMENTS AT THE INTERCHANGE

4.0 INTRODUCTION

This group of solutions addresses problems experienced at the modal interchange point (e.g. within airports or at major rail stations or ports). It includes improvements to infrastructure which will facilitate movement within the interchange facility, design details which should make movement easier and quicker, and other interventions designed to make the time spent within the interchange more pleasant or productive. Note, however, that solutions involving improvements to the provision of information are to be found in Section 7.

Some of the solutions in this section, e.g. car parks and traveller facilities, may generate revenues but most do not – except indirectly in so far as they might contribute to the attractiveness of the interchange. Their financial feasibility may thus be an issue.

Stakeholders thought that Solution 4.2 had particularly high potential to improve interconnectivity and was likely to yield the highest benefit/cost ratio.

The performance of these solutions is summarised in Table 1.3 and a more detailed description of each solution is presented below.

4.1 ADDITIONAL, CONVENIENTLY LOCATED, CAR PARKS

4.1.1 Description

Equip interchange points with additional car parks at convenient locations so that the capacity available meets (peak) demand. Depending on the land value and demand, multi-storey car parking may be justified (higher expense but allows more cars to be parked close to the main interchange). Where a new interchange is being constructed, underground parking may be provided (and, of course, this can result in a very easy link between the car park and the interchange).

4.1.2 Problems Addressed

A lack of parking space close to interchange points at distinct times which results in less convenient interchange, potentially serving to discourage travellers from interchanging and, instead, making the entire long distance journey by car. Parking which is located at considerable distance from the main interchange location is inconvenient.

4.1.3 Applicability

At all interchange points, where sufficient space is available in its vicinity. The choice of style of facility (surface, multi-storey, underground) will depend on land values, demand and whether the main facility has yet been constructed.

4.1.4 Performance

Cost Construction costs may vary widely, depending on the status quo situation in or around the interchange point, the size of the planned parking lot and the style of it (car park, parking deck, parking garage, multi-storey car park, underground, etc.). The cost of an underground or multi-storey car park can be considerable. In addition, there are on-going costs of operation – in particular relation to security.

Technical feasibility Can be assumed (but retrofitting of underground car parks may be impossible without incurring extremely high costs).

Financial feasibility Depends on the balance income achievable. This in turn may be influenced by the availability of alternative car parking facilities free of charge in the vicinity and the level of service offered on local public transport. Significant net revenues may be achieved in favourable circumstances.

Organisational feasibility No problems are foreseen, but some member states operate parking standards, which set out maximum or minimum levels of parking provision associated with particular types of development.

Acceptance by users Depending on the price and the existing alternatives.

Other aspects of political acceptability There is no reason to expect political problems.

Impact on users' door to door travel time Likely to lead to a slight shortening of travel-times.

Impact on users' door to door travel cost Depending on the parking fees, total costs of travel may increase – particularly if, to make the car park more profitable, free of charge parking zones around the station are abolished. Clearly, this could mean a reduction of access to intermodal transport for people on low incomes.

Initial impact on comfort or convenience Multi-storey and underground facilities tend to be more comfortable than surface facilities when the weather is bad. Whilst the closer a passenger is able to park to the station the more convenient this will be for him.

Users' safety No significant effects expected.

Personal security Security can be an issue at car parks. For that reason it should be combined with better lighting, staffing and monitoring cameras (see 4.11, 4.16 & 4.17).

Access for people with reduced mobility A shortened path between the modes in principle makes access easier for people with reduced mobility. If the car park has several levels the provision of an elevator (see 4.5) or reserved parking zones for disabled people at the front of the station will improve access.

4.1.5 Other Impacts

Improved car parking facilities is likely to lead to a shift away from public transport to private car as a feeder mode. This would lead to an increase in GHG and perhaps also in congestion near the interchange.

4.1.6 Examples

To be found on many railway stations all over Europe. The Karlsruhe Central Railway Station is notable because its car park is located underneath the station.

4.2 CONVENIENT POSITIONING OF LOCAL TRANSPORT SERVICES

4.2.1 Description

Positioning of local public transport access points in prominent and easily accessible locations at airports, ports and major rail stations.

4.2.2 Problems Addressed

Long and/or inconvenient paths between the entrance or the exit of an interchange point to local transport services.

4.2.3 Applicability

At all interchange points, where sufficient space is available in its vicinity.

4.2.4 Performance

Cost Costs may vary widely depending on the status quo situation in or around the interchange point. While bus stops and lines can be transferred quite easily, the relocation of existing stops or lines of rail-based local transport (trams and in particular underground) would incur high costs. In such cases the construction of people-mover systems could be an alternative. Minimal additional costs may apply in the context of newly built interchange points if it is possible to incorporate convenient location into the planning process.

Technical feasibility Can be assumed (but retrofitting of major infrastructure may be impossible without extremely high cost).

Financial feasibility The costs of relocating a local bus stop may be recouped by additional revenue. This may not be the case for services when relocating expensive fixed infrastructure.

Organisational feasibility No specific issues arise unless conflicts exist on the issue of space around the interchange – this may be heightened where there are multiple actors involved, e.g. two or more local transport operators.

Acceptance by users Users appreciate local transport services being located in convenient locations.

Other aspects of political acceptability No specific issues are expected to arise.

Impact on users' door to door travel time The repositioning of services should lead to shortened travel-times but not major time savings.

Impact on users' door to door travel cost No specific impact.

Initial impact on comfort or convenience A reduction in travel time would improve the convenience for travellers.

Users' safety No significant effects expected.

Personal security No significant effects expected.

Access for people with reduced mobility For these user groups a convenient positioning of local public transport will help improve access.

4.2.5 Other Impacts

None are identified.

4.2.6 Examples

Convenient positioning of local public transport can be found on many railway stations all over Europe. The Karlsruhe Central Railway Station is notable because the access / egress to tramways (directly in front of the station) are totally separated from the private car park. The recently constructed Leeds Bus Interchange, adjacent to Leeds train station, represented a significant improvement for many bus-users in Leeds.

4.3 CONVENIENT POSITIONING OF TAXI SERVICES

4.3.1 Description

Positioning of taxi ranks in a prominent and easily accessed location at airports, ports and major rail stations.

4.3.2 Problems Addressed

Long and / or inconvenient paths between the entrance and exit of an interchange point to the taxis stands.

4.3.3 Applicability

At all interchange points, where there is demand for taxi services and where space exists (and is better allocated to taxis than to public transport – see Solution 4.2).

4.3.4 Performance

Cost Costs will vary depending on the status quo situation in or around the interchange point. Improved positioning of taxi services at an interchange may require the relocation of other services.

Technical feasibility No specific issues.

Financial feasibility Costs may be recouped through charges levied on taxi companies.

Organisational feasibility To relocate other services (car park, bus stops, etc.) in favour of taxi stands, might cause problems. Also, security issues can arise if taxis are allowed to approach too close to airport terminal buildings.

Acceptance by users Is given for the users of taxis services. Users of car parks, bus stops etc. might be unhappy with their relocation if it directly affects access to their modes.

Other aspects of political acceptability Problems might arise if the relocation of taxi stands disadvantages those who use public transport.

Impact on users' door to door travel time A slight reduction in taxi-users' travel-times can be expected (for others longer travel-times could apply if the relocation of the taxi stand directly affects their access to their modes).

Impact on users' door to door travel cost No specific impact (unless taxi fares have to rise to pay charges to access the convenient location).

Initial impact on comfort or convenience Increased convenience for taxi users, whereas the users of other feeder modes may experience more inconvenience if their accessibility is reduced.

Users' safety No significant effects expected.

Personal security Variations may apply in the same manner as stated with regards to convenience.

Access for people with reduced mobility Variations may apply in the same manner as stated concerning comfort or convenience.

4.3.5 Other Impacts

No significant impacts are expected.

4.3.6 Examples

Prominent positioning of taxi stands can be found on many railway stations and airports all over Europe.

4.4 MOVING WALKWAYS

4.4.1 Description

Use of moving walkways or 'travelators' (escalators without the steps) to speed the movement of passengers.

4.4.2 Problems addressed

Time and effort required to cover large distances within major interchanges.

4.4.3 Applicability

Wherever walking distances within an interchange point exceed a comfortable walking distance.

4.4.4 Performance

Cost Moving walkways (depending on the length) can cost less than €1m. They do have significant ongoing maintenance costs.

Technical feasibility Moving sidewalks are a proven technology used all over the world, especially (but not only) in stations / terminals of multiple modes.

Financial feasibility Will not generate direct revenues but may be cheaper, over time, than staffed transport systems (e.g. bus shuttles) and may contribute to the interchange revenues indirectly by increasing its attractiveness to users.

Organisational feasibility No problems foreseen.

Acceptance by users Is assumed; overcome long walks is welcomed by the traveller.

Other aspects of political acceptability There is no reason to expect political problems.

Impact on users' door to door travel time A slight reduction in travel-times applies.

Impact on users' door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience Comfort and convenience is increased.

Users' safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility Unlikely to provide a significant advantage other than mentioned under comfort or convenience. It should be noted that some disabled travellers find moving walkways difficult to negotiate.

4.4.5 Other Impacts

None identified.

4.4.6 Examples

Most major airports in Europe have at least one moving walkway. For example, in Manchester, moving walkways are used to improve connectivity between Manchester Airport railway station and the Airport terminal buildings.

4.5 ELEVATORS & ESCALATORS

4.5.1 Description

An elevator (or lift) is a vertical transport vehicle that efficiently moves people or goods between floors of a building. An escalator is a moving staircase – a conveyor transport device for carrying people between floors of a building. The device consists of a motor-driven chain of individual, linked steps that move up or down on tracks, allowing the step treads to remain horizontal.

4.5.2 Problems Addressed

To overcome necessary level changes at an interchange station.

4.5.3 Applicability

Where there are a significant number of people who need to move up or down and where there is room to provide an escalator or elevator.

4.5.4 Performance

Cost Escalators are available from €200,000 upwards. Combined with an elevator and – depending on specific layout and the number of them needed in an interchange point – costs vary and can sum to more than €10m. It should be noted that escalators and elevators also have ongoing operation and maintenance costs.

Technical feasibility Proven technology.

Financial feasibility Will not generate direct revenues but may contribute to the interchange revenues indirectly by increasing its attractiveness to users.

Organisational feasibility No problems foreseen.

Acceptance by users Is assumed.

Other aspects of political acceptability There is no reason to expect political problems.

Impact on users' door to door travel time Only slight reductions of travel-time may apply (if at all).

Impact on users' door to door travel cost No effect expected.

Initial impact on comfort or convenience Elevators or escalators make level changes easier, for most travellers – especially those with baggage – and so help improve convenience for travellers.

Users' safety No effect expected.

Personal security No effect expected.

Access for people with reduced mobility Elevators and especially escalators allow disabled people to avoid stairs at level changes at an interchange point. As escalators are not suitable for all disabled people, the existence of elevators (with tactile control elements) is preferred to escalators, especially if escalators are accompanied by an elevator or ramps suitable for wheelchairs. In some member states where there is disability legislation, these features may be a legal requirement.

4.5.5 Other Impacts

None identified.

4.5.6 Examples

Elevators / escalators exist in most transport terminals.

4.6 LEVEL ACCESS TO TRAINS AND BUSES

4.6.1 Description

Avoiding the need for steps, stairways, elevators or escalators by appropriate design layout. Examples include: raising the platform level to enable stage less entering of trains. Use of ramps instead of stairways within the interchange point. Use of air bridges for direct access to aircraft. Provision, where possible, of at-grade access to platforms instead of subways or footbridges.

4.6.2 Problems Addressed

The necessity of using steps or stairways makes the change between modes of transport inconvenient especially for travellers with luggage or pushchairs or for disabled people.

4.6.3 Applicability

Everywhere, but some solutions (ramps) may be excluded when a lack of space applies.

4.6.4 Performance

Cost These depend very much on the size and layout of existing interchange points. Upgrading an existing railway platform may exceed €100,000. No (or minimal) additional costs may apply in the case of a new build.

Technical feasibility Depends on layout of the site – some solutions may be impossible.

Financial feasibility Will not generate direct revenues so the feasibility depends on cost – and hence on the site details. Improving level access may contribute to the interchange revenues indirectly by increasing its attractiveness to users.

Organisational feasibility No problems foreseen except where there is potential for dispute as to who is responsible for funding and implementation, e.g. where one company has responsibility for vehicles and another has responsibility for fixed infrastructure.

Acceptance by users High, especially for the travellers with luggage or a child's pushchair or for disabled people. A potential exception to this is where ramps require long diversions. In such cases it might be that passengers would prefer a stairway to provide a faster route.

Other aspects of political acceptability No problems expected.

Impact on users' door to door travel time Increases where a long diversion is introduced.

Impact on users' door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience Improvement in the convenience for those specific groups of travellers already mentioned.

Users' safety Reduces the risk of falling.

Personal security No particular impact is expected.

Access for people with reduced mobility Makes travelling especially for wheelchair users much easier. In fact, for some disabled people, it may be the difference between allowing them to use or not use an interchange facility.

4.6.5 Other Impacts

There is the possibility that, if the change attracts users who would otherwise have travelled by car or taxi, the resulting modal shift will reduce GHG emissions and, perhaps also congestion levels.

4.6.6 Examples

Use of ramps for boarding and alighting trains is becoming common-place, particularly in countries such as Britain, where it is required by law. A programme of platform-height alterations has been undertaken across various parts of the London Underground and at selected British railway stations. Use of 'Kassel' curbs, or other raised curb designs, has been made in a number of locations, including the Leeds Guided Bus system and the Karlsruhe tramtrain.

4.7 VISIBILITY AXIS BETWEEN MODES

4.7.1 Description

Design of facilities such that, when approaching or entering an interchange point on one mode (including on foot) one can clearly see where one should go to access another means of transport.

4.7.2 Problems Addressed

Difficulties in orientation and complex paths required when changing from one mode to another within the interchange point.

4.7.3 Applicability

In principle everywhere, but basic conditions due to security, structure etc. of buildings may hinder the implementation of visible axes. Particularly relevant as a design principle when a new terminal is being built or an existing one is being radically re-designed.

4.7.4 Performance

Cost Depends very much of the layout at existing facilities. In the worst case visible axes are reachable only when applying a new construction. For new buildings the implementation of visible axes does not necessarily incur extra costs.

Technical feasibility Depends very much on the layout at existing facilities.

Financial feasibility Will not generate direct revenues so financial viability depends very much on the layout at existing facilities and the argument that better layout may contribute to the interchange revenues indirectly increasing as its attractiveness to users rises.

Organisational feasibility No problems foreseen.

Acceptance by users Users intuitively accept a visible axis.

Other aspects of political acceptability Not known.

Impact on users' door to door travel time For passengers who are not familiar with the interchange point, a slight reduction of travel time may occur.

Impact on users' door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience Passengers who feel less certain about the paths to take within an interchange point will feel more comfortable whilst making their journey.

Users' safety No particular impact is expected.

Personal security No significant impact.

Access for people with reduced mobility People with reduced mobility are likely to benefit more than those with normal levels of mobility since choosing the wrong path, due to the absence of visible paths, will have a greater impact per se.

4.7.5 Other Impacts

None identified.

4.7.6 Examples

Railway station Amsterdam Duivendrecht, Frankfurt Airport long distance railway station to terminal 1.

4.8 DIRECT, UN-INTERRUPTED, LOGICAL PATHS

4.8.1 Description

Design of interchanges such that, when approaching or passing through an interchange point, clear, logical paths make orientation easier and the absence of obstacles makes passage easier and quicker.

4.8.2 Problems Addressed

Difficulties in orientation and complex paths required when changing from one mode to another within the interchange point. The presence of obstacles and constrictions can result in bottlenecks and delay.

4.8.3 Applicability

In principle everywhere, but basic conditions due to security, structure etc. of buildings may hinder the implementation of direct logical paths.

4.8.4 Performance

Cost Depends very much on the layout at existing facilities. In the worst case, direct logical paths are reachable only when applied to a new construction. For new buildings the implementation of visible axis does not necessarily mean extra costs.

Technical feasibility Depends very much on the layout of existing facilities.

Financial feasibility Will not generate direct revenues so financial feasibility depends very much on the layout at existing facilities and the possibility that it may contribute to the interchange revenues indirectly by increasing its attractiveness to users.

Organisational feasibility No problems foreseen.

Acceptance by users Users intuitively accept direct logical paths and prefer un-interrupted paths.

Other aspects of political acceptability Not known.

Impact on users' door to door travel time For passengers who are not familiar with the interchange point, a slight reduction of travel-time may occur.

Impact on users' door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience Passengers who feel certain about which paths to take within an interchange point feel more comfortable.

Users' safety No significant impact.

Personal security No significant impact.

Access for people with reduced mobility People with reduced mobility are likely to benefit more than those with normal levels of mobility since choosing the wrong path, due to the absence of visible paths, will have a greater impact per se..

4.8.5 Other Impacts

None identified.

4.8.6 Examples

Many interchange points have such a layout. Railway station Amsterdam Duivendrecht is mentioned in one of the sources reviewed.

4.9 PROVISION OF ASSISTANCE FOR TRAVELLERS WITH REDUCED MOBILITY

4.9.1 Description

Provision of staff, children's push chairs and other services to assist users of airports, ports and major rail stations who have reduced mobility (e.g. people with disabilities, heavy luggage, or children).

4.9.2 Problems Addressed

A range of possible problems can be addressed this way, including difficult orientation for blind and vision impaired travellers without personal assistance, difficult walking conditions for wheelchair-users or other people with walking difficulties, difficulties faced by travellers with heavy luggage and those accompanied by children. Particular problems occur when the route from one point in the interchange to another is long, tortuous or involves the need to climb or descend steps etc.

4.9.3 Applicability

In principle everywhere.

4.9.4 Performance

Cost. Additional staff may be required – although, at the margin, helping disabled passengers may become part of the duties of existing staff, as such additional costs are not thought to be significant.

Technical feasibility No problems.

Financial feasibility Will not generate revenue and so, despite low cost involved, political or legal justification may be required (legal obligations as well as public funds to implement such facilities for disabled people may exist in some countries).

Organisational feasibility No problems are anticipated unless there is dispute about who provides and pays for such assistance

Acceptance by users High for the targeted group of travellers.

Other aspects of political acceptability There is no reason to expect political problems.

Impact on users' door to door travel time A reduction may apply for the targeted group of travellers.

Impact on users' door to door travel cost If help at the interchange point allows travelling without an accompanying assistant for the targeted user groups, this may reduce their travel-costs significantly. Furthermore, improving interchange between modes of public transport will contribute toward disabled people being able to make their journey without the need for a taxi, again reducing travel cost.

Initial impact on comfort or convenience The ability to travel independently will improve the comfort and convenience for the targeted user groups.

Users' safety Is increased for the targeted user group.

Personal security An improvement for the targeted user group..

Access for people with reduced mobility This will clearly increase their access to long-distance travel.

4.9.5 Other Impacts

None identified.

4.9.6 Examples

Assistance is generally available at airports once travellers arrive at the check-in desk, but no examples are known where this is available for moving from other public transport to the airport check-in, nor for arriving at train stations or ports. For rail, assistance is often available with prior arrangement, and a national system of disabled passenger rail assistance exists throughout the UK. However, the 'mode-specific' assistance sometimes breaks down where there is an interchange but the two modes are not immediately co-located.

The "Bahnhofsmission" has existed to offer assistance to passengers⁴⁸ at large train stations in Germany for more than 100 years.

Several European train operators offer assistance to passengers. The service offered by Deutsche Bahn is detailed on its website⁴⁹.

4.10 TACTILE GUIDANCE SYSTEMS FOR DISABLED

4.10.1 Description

Use of tactile paving (also called truncated domes, detectable warnings, Tactile Ground Surface Indicators, or detectable warning surfaces) in interchanges to assist disabled travellers to find their way.

4.10.2 Problems Addressed

Difficult orientation for blind and vision impaired travellers without personal assistance.

4.10.3 Applicability

In principle everywhere, but should be accompanied by solutions for stage less paths.

4.10.4 Performance

Cost Significant costs apply when upgrading existing interchange points, especially in correspondence with the implementation of stage less paths. Tactile guidance systems are available

⁴⁸ <http://www.bahnhofsmmission.de/> (last opened 1/02/11)

⁴⁹ <http://www.bahn.de/i/view/GBR/en/services/overview/handicap.shtml> (last opened 1/02/11)

at reasonable costs, when renovating a station anyway or when building new interchange points. Tactile construction elements rarely impose ongoing costs.

Technical feasibility No significant problems.

Financial feasibility Will not generate revenue and so could need political or legal justification (legal obligations as well as public funds to implement such facilities for disabled travellers may exist in some countries).

Organisational feasibility No problems anticipated

Acceptance by users High for the intended group of travellers, but some people with walking difficulties may find it makes uncomfortable walking conditions and, consequently, might be resistant.

Other aspects of political acceptability There is no reason to expect political problems.

Impact on users' door to door travel time A shortening of travel time may apply for the targeted group of travellers.

Impact on users' door to door travel cost If tactile guidance allows travelling without an accompanying assistant for the targeted user groups, this may reduce their travel-costs significantly.

Initial impact on comfort or convenience Travelling independently and the convenience for the targeted user group. However, for some people with walking difficulties, tactile paving may make walking conditions more uncomfortable.

Users' safety Is increased for the targeted user group.

Personal security Unlikely to be improved.

Access for people with reduced mobility This will clearly increase access to long-distance travel for those with visual impairments. Although for people with walking difficulties it may make access more difficult.

4.10.5 Other Impacts

None identified.

4.10.6 Examples

Tactile guidance systems are standard in several countries such as the UK. Furthermore, new build stations tend to be equipped as standard e.g. the stations of the Karlsruhe TramTrain system.

4.11 IMPROVED LIGHTING

4.11.1 Description

Illumination in all areas of interchange locations, either by natural sunlight and /or artificial light.

4.11.2 Problems Addressed

Feeling uncomfortable or unsafe in the specific parts of an interchange point (waiting areas, facilities for passengers, connecting paths, parking lots, etc.) particularly when no staff are present and when patronage of such areas is sporadic, (e.g. during the off-peak).

4.11.3 Applicability

Everywhere in the interchange area

4.11.4 Performance

Cost Costs depend on the layout and size of the interchange area and whether one is upgrading an existing facility or building a new one. The extensive usage of daylight (where applicable) can limit the permanent costs of illumination.

Technical feasibility This is assumed for artificial light installations however the usage of daylight may be limited in the case of subterranean areas of interchange stations.

Financial feasibility Will not generate direct revenues and so the financial case depends on assuming an indirect contribution to interchange revenues via greater passenger demand as a result of a safer environment.

Organisational feasibility No problems are foreseen.

Acceptance by users Is assumed.

Other aspects of political acceptability No problems expected.

Impact on users' door to door travel time No particular impact is expected.

Impact on users' door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience Passengers' will feel more comfortable whilst travelling. In addition orientation may improve when adequate lighting is used, especially for those with sight problems.

Users' safety Likely to lead to better orientation for all passengers but especially those with sight problems. For this group improved lighting may result in fewer accidents when travelling through the interchange stations.

Personal security Well lit and illuminated areas improve the feeling of security amongst passengers, particularly in the off peak. In addition it is likely to lead to a reduction in the probability of criminal acts, especially when combined with the installation of surveillance cameras.

Access for people with reduced mobility Orientation should become easier for vision impaired travellers.

4.11.5 Other Impacts

None identified.

4.11.6 Examples

From the literature reviewed, the lighting at the rail station in Bern, Switzerland has been identified as an example of good practice.

4.12 INCREASE SPACE AND COMFORT AT WAITING AREAS

4.12.1 Description

Enlarge waiting areas and platforms to allow more space for passengers. At the same time improving the quality of the waiting areas, e.g. additional and more comfortable seating, the introduction of vending machines and/or kiosks and the provision of better shelters, particularly on open platforms.

4.12.2 Problems Addressed

For peak hours the amount of space and seats available for passengers may be insufficient to cater for the demand. In addition the general level of comfort experienced at both peak and non-peak

periods may be sub-standard and adversely affect the image of public transport to the detriment of demand for public transport services.

4.12.3 Applicability

At all interchange points – where space exists, i.e. not just at platforms but throughout the interchange areas, for example information point areas and ticketing halls

4.12.4 Performance

Cost Costs may vary widely, depending on the status quo situation in the interchange point but will generally be low.

Technical feasibility Depends on local circumstances (e.g. problems may occur when enlarging platforms such as a reduction of the number of tracks in a railway station).

Financial feasibility Will not generate revenue directly (except perhaps where vending machines are installed at the same time) but could contribute indirectly to the overall revenues by increasing patronage to the interchange.

Organisational feasibility No problems foreseen.

Acceptance by users Likely to be positive.

Other aspects of political acceptability No problems expected.

Impact on users' door to door travel time No impact is expected – unless previous conditions were very congested.

Impact on users' door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience This solution will lead to a positive impact upon the levels of comfort experienced by travellers.

Users' safety More space on platforms reduces the probability of accidents caused by crushes.

Personal security No impact is expected.

Access for people with reduced mobility More space on platforms will make it easier for people with reduced mobility to navigate around the interchange area.

4.12.5 Other Impacts

None identified.

4.12.6 Examples

When luggage/ mail transport was ceased in Germany some 20 years ago, the layout at some main stations of the German railway network was changed: The separate platforms for luggage / mail feed to trains were removed in favour of moving the tracks in a way that the passenger platforms could be made wider.

4.13 PROVISION OF SERVICES FOR TRAVELLERS

4.13.1 Description

Provision of additional services potentially useful to travellers (e.g. information desks, ticket offices & machines, car or bike rental, baggage lockers, food outlets, retail outlets, cash-machines, on-site hotels, etc).

4.13.2 Problems Addressed

The lack of opportunity for travellers to make productive use of their time when interchanging and any discomfort that they might face whilst they are interchanging. Shortage of funding for other (non-revenue generating) facilities.

4.13.3 Applicability

Wherever there is sufficient space and anticipated passenger numbers are high enough to justify the initial investment and ongoing costs.

4.13.4 Performance

Cost Costs mainly depend on the number of different service facilities / shops to be offered.

Technical feasibility No issues.

Financial feasibility Depending on the sales figures achievable, rental fees may be sufficient to finance the necessary investments and may result in significant additional revenue which may make a major contribution to the finances of the whole interchange point. This especially applies to retail facilities.

Organisational feasibility No problems foreseen.

Acceptance by users If prices for the services offered do not vary too much from the price level elsewhere, a high user acceptance applies.

Other aspects of political acceptability No problems foreseen.

Impact on users' door to door travel time No particular impact is expected.

Impact on users' door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience Very positive

Users' safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility No particular impact is expected.

4.13.5 Other Impacts

None identified.

4.13.6 Examples

Services for travellers are offered more or less at every interchange point. What distinguishes "good" examples from the mass is often the layout and arrangement of these services in the interchange. Good examples identified in the literature include Zurich Central Station and Madrid Atocha station. Copenhagen airport offers a mobile personal information service (SOPOS Gatecaller) that will text you when your plane is ready to board.

4.14 TRAIN INFORMATION / TICKETS AT BAGGAGE CLAIM AREA OF AIRPORTS

4.14.1 Description

Providing information about the schedules of trains departing from the airport railway station and selling tickets for those trains (via an office or ticket machines) in the airport's baggage claim area,

4.14.2 Problems Addressed

Allows productive use of travellers' time whilst waiting for luggage and provides valuable information about their options for onward journeys.

4.14.3 Applicability

At every airport which has an on-site rail station.

4.14.4 Performance

Cost The cost of providing schedule information are generally low – although real-time displays will require initial investment. The installation of ticket machines, or of an office would also incur initial costs. A staffed selling point would incur ongoing costs.

Technical feasibility No significant issues.

Financial feasibility Unlikely to generate additional revenue (tickets would otherwise have been purchased elsewhere) but may contribute indirectly to the interchange revenues by improving its attractiveness to users.

Organisational feasibility Ticket office staff would need to be allowed to enter the secure area of the airport.

Acceptance by users Is likely to be high.

Other aspects of political acceptability No problems expected.

Impact on users' door to door travel time For passengers who need to purchase a train ticket for their onward travel by train when arriving by air at the airport there will be a slight reduction to their travel-time may.

Impact on users' door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience The productive use of time spent waiting for the baggage could be considered an improvement in convenience for travellers.

Users' safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility No particular impact is expected.

4.14.5 Other Impacts

None identified – except the possibility that, if the change attracts users who would otherwise have travelled by car or taxi, the resulting modal shift will reduce GHG emissions and, perhaps also congestion levels.

4.14.6 Examples

Train information is given at Copenhagen Airports in baggage claim area (unstaffed). Train departures are indicated in Zurich Airport's baggage claim area. Passengers disembarking at Geneva airport receive a complimentary 'urban transport' ticket to use on the city's urban transport network for your onward journey before leaving the luggage area.

4.15 MULTILINGUAL OR PICTOGRAM INFORMATION

4.15.1 Description

Provision of information not only in the national language but in several languages or with a graphic symbol that conveys its meaning through its pictorial resemblance to a physical object.

4.15.2 Problems Addressed

Interchange points especially with international focus, have high frequencies of passengers who are unfamiliar with the national language. These people are also likely to be unfamiliar with the layout of the interchange point and so require guidance - either through signage in a language they can understand or through a pictogram. The latter may also be useful for people with literacy problems.

4.15.3 Applicability

All interchange points with an international focus would benefit from multilingual information or the use of pictograms.

4.15.4 Performance

Cost These are expected to be low especially as they can be integrated with the national language signs.

Technical feasibility No problems are envisaged.

Financial feasibility No additional revenue is generated – but the overall revenues of the interchange may be increased if additional travellers are attracted by the overall increase in convenience.

Organisational feasibility No problems foreseen.

Acceptance by users Passengers not familiar with the national language will welcome information which is more easily understood.

Other aspects of political acceptability No problems foreseen.

Impact on users' door to door travel time No particular impact is expected.

Impact on users' door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience Better understood information will bring increased convenience for travellers.

Users' safety No direct impact.

Personal security No direct impact.

Access for people with reduced mobility No specific impact.

4.15.5 Other Impacts

None identified.

4.15.6 Examples

To be found at every international airport but the quality is variable.

4.16 INCREASED PROVISION OF STAFF

4.16.1 Description

To equip interchange points with staff to improve service quality and security.

4.16.2 Problems Addressed

Increased staffing of interchange points may help overcome a number of problems for example: (1) Some passengers need personal assistance for travel related needs, as a result of mobility difficulties; (2) Others require help in terms of operating ticket machines or obtaining directions through the interchange point; (3) If there are disruptions to travel services, passengers welcome the presence of knowledgeable staff able to provide personally-tailored information; (4) Safety and personal security are issues that may be prominent within an interchange point and additional staff can help overcome this particularly during off-peak periods; and finally (5) Additional staff can be used to insure improved cleanliness of interchange areas.

4.16.3 Applicability

Everywhere.

4.16.4 Performance

Cost The costs of (additional) staffing clearly depends upon the number of new employees.

Technical feasibility No problems foreseen.

Financial feasibility Additional revenues may be earned in some cases (e.g. if staff encourage travellers to purchase additional goods or services) but the main argument for increased staffing is that the overall increase in attractiveness of the interchange will contribute indirectly to increased revenues.

Organisational feasibility No particular problems are foreseen.

Acceptance by users Acceptance by users is likely to be high; even travellers who rarely need assistance welcome the availability of staff in case of transport irregularities or for security reasons.

Other aspects of political acceptability No problems are foreseen.

Impact on users' door to door travel time No particular impact is expected.

Impact on users' door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience The travel experience is likely to be made more convenient.

Users' safety Provision of additional staff may increase the likelihood that hazards are quickly detected and dealt with - thus a positive impact might be expected.

Personal security Staffing of interchange points improves the personal security, especially at times of the day when the interchange point is less frequented by travellers.

Access for people with reduced mobility The availability of staff at interchange points improves the level of assistance available and so improves the usability of intermodal transport chains for people with reduced levels of mobility.

4.16.5 Other Impacts

None identified.

4.16.6 Examples

The majority of large international airports will have airport assistance available for passengers with reduced mobility⁵⁰. It is more difficult to find examples of increased staffing for other tasks apart from the presence of staff to assist passengers at self service check in and baggage drop off⁵¹.

4.17 PROVISION OF MONITORING CAMERAS

4.17.1 Description

Cameras permanently monitoring all areas in the interchange point – possibly with staff monitoring the images in real-time.

4.17.2 Problems Addressed

Personal security of travellers and vandalism, especially when and where the interchange point is less frequented by travellers.

4.17.3 Applicability

At all interchange points.

4.17.4 Performance

Cost Installation and maintenance costs are generally quite low. Staffing costs can be high if the images are being permanently monitored but are low if records are reviewed only after incidents.

Technical feasibility Is proven

Financial feasibility Will not produce any direct revenue but, if the overall attractiveness of the interchange attracts more travellers, revenues might be increased indirectly. Where there are numerous security/vandalism incidents, investment in monitoring cameras may be recouped in a short period of time.

Organisational feasibility No problems foreseen, as long as all legal aspects concerning data privacy are respected.

Acceptance by users While increased personal security is welcomed, privacy issues may be considered problematic by some users.

Other aspects of political acceptability Security versus data privacy issues have to be balanced.

Impact on users' door to door travel time No particular impact is expected.

Impact on users' door to door travel cost No particular impact is expected.

⁵⁰ <http://www.manchesterairport.co.uk/manweb.nsf/Content/AirportAccessibilty> & <http://www.gatwickairport.com/at-the-airport/special-assistance/>

⁵¹ http://www.klm.com/travel/gb_en/prepare_for_travel/checkin_options/airport_checkin/index.htm

Initial impact on comfort or convenience Improved security makes the traveller feeling more comfortable whilst at the interchange.

Users' safety Improves the ability to identify when a traveller is in distress and enables assistance to be sent sooner than without the cameras.

Personal security Improved levels of personal security are widely evidenced.

Access for people with reduced mobility No impact – except that a disabled traveller in distress may be noticed sooner than might be the case if there were no cameras and assistance may therefore be sent to them more quickly.

4.17.5 Other Impacts

None identified.

4.17.6 Examples

Numerous interchanges are equipped with monitoring cameras.

4.18 CYCLE FACILITIES AT MODAL INTERCHANGES

4.18.1 Description

Secure cycle sheds at railway station, ports or airports, possibly associated with additional services such as cycle repair & maintenance, cycle rental, shower facilities etc. Sometimes usefully combined with cycle routes from the interchange (Solution 2.16).

4.18.2 Problems Addressed

For passengers who use their bikes as a feeder mode for train travel there is a demand for secure bike parking at train stations. Such parking may not be available or is not provided in sufficient capacity to meet the demand for it. For travellers arriving at a destination rail station who wish to continue their journey using a bike they are often unable to do so because no bike hire is provided that would allow this.

4.18.3 Applicability

In principle at every railway station to ensure that passengers can have the confidence to use bikes to access and egress train stations during their journeys.

4.18.4 Performance

Cost This is likely to be relatively low on a station by station basis, however if full coverage is provided throughout the rail network the costs would begin to approach a significant level of spending.

Technical feasibility No problems.

Financial feasibility Depending on the actual demand which materialises, financial support may be required to ensure the continuity of such services.

Organisational/legal feasibility This will vary from country to country with the number of organisations involved likely to depend upon the organisational structures in place within each of these countries. For example in the UK discussions would have to take place between the owners and operators of rail stations (Network Rail & Train Operating Companies) and local authorities or private companies who may wish to push forward such schemes.

Acceptance by users Can be assumed.

Other aspects of political acceptability No problems expected.

Impact on users' door to door travel time Possible savings for existing bicycle users. Time savings for users of other modes that switch to bicycles will depend upon the distance they have to travel and the congestion levels affecting other modes.

Impact on users' door to door travel cost This will depend upon the level of charges for any new facilities. It is not thought however that there would be any significant impact on bicycle users. If users of other access modes changed to bicycle following installation of the racks, they would be likely to benefit from the lower costs associated with travelling by bicycle.

Initial impact on comfort or convenience A secure bike parking area located near to the entrance of the station is likely to improve the convenience of accessing the train station for cyclists. If the secure parking also provides shelter for the bikes & helmets from the weather then this is likely to improve the comfort of the cyclists when they ride home after returning to the station.

Users' safety No particular impact is expected.

Personal security No impact – unless the cycle parking facilities are staffed or have surveillance cameras – in which case personal security may be improved. Secure cycle parking facilities should also reduce the incidence of bicycles being stolen.

Access for people with reduced mobility No impact is expected.

4.18.5 Other Impacts

If significant numbers of users are attracted from car or taxi, reductions in congestion and GHG might be expected.

Provision of very visible cycle facilities can enhance a city's green credentials in the eyes of visitors.

4.18.6 Examples

Amsterdam Central railway station and the Osterport railway station in Copenhagen are well known examples of stations equipped with such bike facilities.

4.19 USE OF CHARGES AND SUBSIDIES TO REDUCE CONGESTION AT THE INTERCHANGE

4.19.1 Description

Use of charges and levies to reduce congestion on the access links to the modal interchange. Any additional revenue could be used to improve or subsidise alternative access modes.

4.19.2 Problems Addressed

Congestion on access links (usually, but not exclusively, on road access links).

4.19.3 Applicability

Wherever there is an issue of under provision of capacity on the access links (particularly likely during peak periods).

A specific example might be an airport where substantial numbers of passengers use "kiss and ride" to get to the airport (and then a taxi or "meet and greet" to return home) rather than public transport or driving to the airport and leaving the car parked there (and then driving back home). "Kiss and ride" and "meet-and-greet" and taxi are particular contributors to congestion because they result in up to four access trips for each out-and- back air traveller (two on departure from the airport and two on

return) – compared to just two associated with drivers who park at the airport for the duration of their trip. Although levies might reduce kiss-and-ride, meet-and-greet and taxi trips an alternative approach might actually be to reduce medium and long term parking charges (provided that this did not encourage existing public transport users to drive and park instead).

In fact, although use of public transport is generally to be encouraged, if the public transport links are over-congested some benefit might be gained by increasing the charges on such services (or reducing the price of alternatives).

4.19.4 Performance

Cost If several operators are involved (e.g. airport manager, car park operator, public transport operator), the costs of administration could be non-trivial.

Technical feasibility No significant hurdles exist but the identification of optimal prices might require some trial and error.

Financial feasibility It is possible, in principle, to design pricing regimes which are revenue neutral or even generate additional revenue.

Organisational feasibility Organisational and legal problems regarding the agreements between parties could emerge – particularly if some parties are faced with decreased net revenues.

Acceptance by users Efficient pricing should, in theory, provide improvements of the transport conditions and so should be desirable for users. However experience has shown that the introduction of congestion charging is not generally popular and significant numbers of travellers are likely to protest against the introduction of such charges. This would contrast strongly with the likely acceptance of a policy that provided subsidised parking.

Other aspects of political acceptability Political opposition is to be expected.

Impact on users' door to door travel time Travel time savings could arise for some travellers if the solution results in reduced congestion.

Impact on users' door to door travel cost Cost savings will arise for some travellers, cost increases for others. Overall, the average cost per passengers should, in theory, be reduced.

Initial impact on comfort or convenience No particular impact is expected.

Users' safety No significant effect is envisaged.

Personal security No particular impact is expected.

Access for people with reduced mobility No particular impact is expected.

4.19.5 Other Impacts

Environmental benefits could arise if the solution leads to a reduction in the number of car journeys to and from airports (but this is not guaranteed – if the marginal costs of access by public transport exceed those of access by car, an efficient pricing regime would result in an increase in road journeys).

4.19.6 Examples

Edinburgh Airport's Surface Access Strategy 2007-2011 seeks to improve users' access conditions (in accordance with government transport policy objectives). It includes a proposal to encourage the move from 'kiss and fly' to "park and fly" through appropriate charging. Another initiative at Edinburgh airport, is a levy on car parking (the so-called Public Transport Levy). This was introduced in 2003 with the aim of funding public transport initiatives such as the Edinburgh airport rail link. In particular,

a levy is charged on short-stay airport parking, with an average contribution of 20 pence (circa 23 cents) per car, leading to around £200,000 (€234,000) per year being raised.

4.20 MULTI-MODAL INFORMATION & TICKETING BOOTHS

4.20.1 Description

These would be located in every major interchange and would provide information on and tickets for all modes of regional transport such as rail, bus, metro and taxis.

4.20.2 Problems Addressed

Offers the traveller a 'one shop' facility that would provide a full range of options for continuing the journey from the interchange to the final destination. This allows the traveller to consider the full range of options without having to spend time seeking information at different locations. As such it will lower transaction costs and make interchange much easier. (For more examples of solutions relating to ticketing and information, see Sections 6 and 7).

4.20.3 Applicability

At every major interchange facility, rail stations, airports, coach stations, ports.

4.20.4 Performance

Cost The costs incurred will be related to staffing costs and back office systems to print out tickets for various modes and to reallocate these revenues to the operators providing the services.

Technical feasibility No significant issues.

Financial feasibility Unlikely to generate additional revenue (tickets would otherwise have been purchased elsewhere) but may contribute indirectly to the interchange revenues by improving its attractiveness to users. May also lead to a more balanced distribution of revenue across modes since the traveller will be able to compare costs and journey times across rail, bus and taxi for example.

Organisational feasibility The key issue that will require a solution will be the reallocation mechanism to reimburse transport operators.

Acceptance by users Is likely to be high.

Other aspects of political acceptability No problems expected.

Impact on users' door to door travel time This may reduce travel time if travellers are able to find the quickest transport mode to their destination and do not have to check multiple sources for travel information.

Impact on users' door to door travel cost It is likely that some travellers will save by being able to choose from a variety of transport options rather than, for example, choosing a taxi because it offers the best chance of arriving closest to their destination.

Initial impact on comfort or convenience This will provide travellers with a much more convenient way to find out travel information and to purchase tickets for the travel choice they decide upon.

Users' safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility No particular impact is expected.

4.20.5 Other Impacts

None identified – except the possibility that, if the change attracts users who would otherwise have travelled by taxi, the resulting modal shift will reduce GHG emissions and, perhaps also congestion levels.

4.20.6 Examples

Transport for London's six travel information centres⁵²

⁵² <http://www.tfl.gov.uk/tickets/14432.aspx> (last opened 1/02/2011).

5 SOLUTIONS INVOLVING IMPROVED PROCEDURES FOR CHECK-IN AND LUGGAGE TRANSFER

5.0 INTRODUCTION

This group of solutions deal with improvements to the procedures for check-in and luggage transfer. Although primarily procedural, all will require some investment in infrastructure and information technology. Even where they do not directly generate additional revenue, the financial case for them may be based on the fact that they may attract additional passengers. Note that, as stated in the Introduction, changes to procedures and facilities associated with the long-distance leg of the journey are beyond the scope of this document.

Stakeholders thought that Solution 5.4 was likely to yield the highest benefit/cost ratio.

The performance of these solutions is summarised in Table 1.4 and a more detailed description of each solution is presented below.

5.1 AT-STATION PASSENGER CHECK-IN FOR FLIGHTS

5.1.1 Description

Provision of a check-in counter at the train station at the start of the train journey to the airport. Hold-luggage would still need to be retained by the traveller until he/she reaches the airport - but see Solutions 5.5 and 5.6. One aspect of this solution which differs from online check-in is that the airline would take responsibility if the passenger failed to get to the gate on time due to a delay of the train (in the same way as they do for checked-through passengers who are late for a connecting flight due to delay on their inbound flight).

5.1.2 Problems Addressed

Delay of the train causing passenger to miss their plane – and being treated simply as a no-show. Does not overcome delays associated with baggage drop-off.

5.1.3 Applicability

Wherever the rail operator offers a sufficiently reliable service and there is a significant number of airport-bound passengers. Particularly where there is a large demand by travellers using one airline (though, in principle, the check-in could deal with passengers from several different airlines). Note that the reduced queuing time benefit is also achieved by encouraging passengers to check-in on-line.

5.1.4 Performance

Cost A check-in desk is required in an appropriate location at the train station, together with staffing and a secure internet connection to the airlines (or airlines') check-in system and a printer for the boarding passes. The technical equipment required for the check-in desk would be relatively standard, leaving the staffing of the desk as the only substantial cost to be incurred.

Technical feasibility There could be data security issues – particularly if several airlines were involved.

Financial feasibility It is not clear whether the introduction of this surface would generate enough additional passengers to cover the installation and running costs of the new service. If not there would be the option of charging passengers for the service. It maybe that the airlines involved are willing to pay for the service where, as in the case of Lufthansa and Deutsche Bahn's *AIRail*, there is an exclusivity arrangement which will benefit the airline through the attraction of away from competitor airlines principally because of the check-in service.

Organisational feasibility An appropriate agreement is required between the airline(s) and the rail company (and the station owner, if different) because the airline is accepting the risk while the rail company is likely to gain the main increase in revenue. Lufthansa and Deutsche Bahn have demonstrated that an exclusive arrangement can be made. Where more airlines are involved, and where the airlines want a share of the profit from the additional rail passengers, such an agreement could become quite complex. It is unlikely to be practical to involve small airlines or charter services.

Acceptance by users Users will like the fact that, once checked in, the airline will accept some responsibility for their connection. Users without any luggage to check-in will welcome the prospect of reduced need to queue at the airport.

Other aspects of political acceptability None identified.

Impact on users' door to door travel time It is difficult to assess what the impact on travel time will be. At a practical level the check in time will remain the same regardless of whether this is done at the railway station or at the airport. There may be an effect from the added connection guarantee which would allow passengers to build smaller safety margins into their train being delayed; and so allow travellers to take a later train. However, it is difficult to say with certainty that this will be the case.

Impact on users' door to door travel cost No impact unless a premium were charged for use of this service.

Initial impact on comfort or convenience Connection security can contribute to the perceived comfort of a trip.

Users' safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility No particular impact is expected.

5.1.5 Other Impacts

If the service attracts users who would otherwise have travelled by car or taxi, the resulting modal shift will reduce GHG emissions and, perhaps, congestion.

5.1.6 Examples

Lufthansa passengers heading for Frankfurt airport have this facility at Stuttgart and Cologne central stations under the exclusive *AIRail* agreement between Lufthansa and Deutsche Bahn. Paddington Heathrow Express also allows check-in at Paddington station. Zürich station has a facility to allow passengers to check in for flights.

5.2 IN-TRAIN PASSENGER CHECK-IN FOR FLIGHTS

5.2.1 Description

Portable check-in facility on board airport-bound trains. Hold-luggage would still need to be retained by the traveller until he/she reaches the airport - but see Solutions 5.6 and 5.7. One aspect of this solution which differs from online check-in is that the airline would take responsibility if the passenger failed to get to the gate on time due to a delay of the train (in the same way as they do for checked-through passengers who are late for a connecting flight due to delay on their inbound flight).

5.2.2 Problems Addressed

Delay of the train causing passenger to miss their plane – and being treated simply as a no-show. Does not overcome delays associated with baggage drop-off.

5.2.3 Applicability

In principle on any train heading for an airport. However, if it is a dedicated airport express, then there is no real gain in interconnection security, because the passenger will have most of his short-distance leg to the airport already behind him once he boards the airport express; furthermore, if an airport express breaks down, then the airlines would be alerted to that and might decide to delay flights anyhow. Therefore the concept would only ever be relevant where longer distance trains, such as those used for the AIRail services to Frankfurt, are involved. Note that the reduced queuing time benefit is also achieved by encouraging passengers to check-in on-line. Increased use of online, or via-mobile, check-in probably renders this "solution" unnecessary.

5.2.4 Performance

Cost A small computer and small printer for boarding cards is needed. If demand is low, the service might be operated at small marginal cost by existing rail staff. If demand is high, additional staff might be required. The costs of administering a co-operative agreement (see below) might be more significant.

Technical feasibility The principal technical problem mentioned in the literature is data transmission⁵³ but given the current standards of wireless internet availability this not likely to be of major concern.

Financial feasibility It is not clear whether the service would attract sufficient additional passengers to justify the costs – even though they are low – or whether passenger would have to pay for the service.

Organisational feasibility An appropriate agreement is required between the airline(s) and the rail company because the airline is accepting the risk while the rail company is likely to gain the main increase in revenue. Lufthansa and Deutsche Bahn have demonstrated that an exclusive arrangement can be made. Where more airlines are involved, and where the airlines want a share of the profit from the additional rail passengers, such an agreement could become quite complex. It is unlikely to be practical to involve small airlines or charter services.

Acceptance by users Users without luggage to check-in will welcome this because it removes the need for any queuing. The fact that the airline will accept some responsibility for a missed flight will also be appreciated.

Other aspects of political acceptability No problems are envisaged.

Impact on users' door to door travel time Users without any luggage to check-in who plan to use the on-train check-in might choose to allow marginally less time at the airport – although they might be caught out if the on-train service was not available to them on a particular day (e.g. due to high demand), and so the prudent traveller would not be able to reduce their overall planned journey time.

Impact on users' door to door travel cost No impact unless a premium were charged for the use of this service.

Initial impact on comfort or convenience There might be a small increase in perceived comfort due to perceived increase in connection security. Some passengers might choose not to use the service if they value the relative privacy associated with online or conventional check-in (e.g. if they want to discuss any special needs).

Users' safety No particular impact is expected.

Personal security No direct impact - but see below.

Access for people with reduced mobility No particular impact is expected.

⁵³ http://www.trafficforum.ethz.ch/vwt_2003/beitraege/VWT19proceedings_contribution_20.1-20.20.pdf (last opened 1/02/11)

5.2.5 Other Impacts

There might be some concern over potential security issues, given the possibility that passengers' details and destination might be overheard on a crowded train.

5.2.6 Examples

There are no current examples, presumably because the necessary administration and costs are not thought likely to be justified, but the idea has been mentioned in the literature (e.g. in Scherz, S and Fakiner, H "Intermodalität am Flughafen Frankfurt – auf dem Weg zu einem integrierten Gesamtverkehrssystem Schiene/Luft"⁵⁴).

5.3 FULL CHECK-IN AND LUGGAGE-DROP POINT AT AIRPORT STATIONS

5.3.1 Description

Check-in and luggage-drop facilities at airport railway stations provided for use by passengers arriving by rail.

5.3.2 Problems Addressed

The necessity of transporting baggage on the train to the airport terminal. This is inconvenient for passengers and makes intermodal travelling less attractive.

5.3.3 Applicability

In principle this might be considered by major airlines at any airport railway station.

5.3.4 Performance

Cost This would involve substantial costs, principally staffing costs and luggage belt installation.

Technical feasibility No significant problems are envisaged.

Financial feasibility If it is difficult to assess how financially feasible this would be. In order to finance this service there would either have to be a direct charge for passengers wishing to use the service or indirect income from the service generating additional passengers.

Organisational feasibility No are problems foreseen provided that each check-in desk is dedicated to a single airline.

Acceptance by users Check-in at the railway station of the airport is very attractive for rail & air passengers.

Other aspects of political acceptability No problems foreseen.

Impact on users' door to door travel time A slight reduction of travel-time may apply, as the time between arrival of the train and the check-in becomes smaller.

Impact on users' door to door travel cost No impact – unless a premium would be charged for use of this service.

Initial impact on comfort or convenience Reduced need to transport baggage from the station to the terminal, so increasing the comfort and convenience of intermodal travelling.

⁵⁴ http://www.trafficforum.ethz.ch/vwt_2003/beitraege/VWT19proceedings_contribution_20.1-20.20.pdf (last opened 1/02/11)

Users' safety No impact is expected (it is assumed that the solution would not be implemented if it was considered likely to compromise luggage security).

Personal security No impact is expected (it is assumed that the solution would not be implemented if it was considered likely to compromise luggage security).

Access for people with reduced mobility Reduced need to transport luggage would be beneficial for people with reduced mobility.

5.3.5 Other Impacts

If the change attracts users who would otherwise have travelled by car or taxi, the resulting modal shift will reduce GHG emissions and, perhaps also congestion levels.

5.3.6 Examples

The long-distance railway station of Frankfurt Airport and at around 50 Swiss train stations⁵⁵.

5.4 DOOR-TO-DOOR LUGGAGE TRANSPORT

5.4.1 Description

A service which picks up a traveller's luggage at home (or designated station), usually two to three days before the travellers leaves, and delivers it to the trip destination before the traveller arrives; for the return leg the luggage is being picked up from the hotel (or designated station) on the departure day and is delivered to the traveller's home or designated station a day or two later. A lower specification variant service could provide luggage pick-up from the door and the delivery to an airport or passenger port, and vice versa.

This solution affects more than just the interconnectivity, since it may cover the entire trip, but its main relevance is the easier access to, interconnections within, and egress from the system.

5.4.2 Problems Addressed

Difficulties in handling luggage, in particular for elderly and disabled travellers. Delays associated with dropping off and reclaiming baggage.

5.4.3 Applicability

This could, in principle, be applied for any trip.

5.4.4 Performance

Cost The cost for setting up and running the service is the same as for any courier service.

Technical feasibility There are no technical problems.

Financial feasibility If the luggage transport were to be charged at the same level as commercial courier service for packages, then given the weight of the luggage, it is likely that only a small number of travellers would be prepared to pay for it. Any profit from the service comes from attracting travellers to a rail journey who would have otherwise travelled by car or even would have stayed at home altogether.

Organisational feasibility The organisation is no more complex than that for any courier service.

⁵⁵ <http://www.zurich-airport.com/desktopdefault.aspx/tabid-116/> (last opened 1/02/11)

Acceptance by users Acceptance is high by those travellers who do have problems handling more than hand luggage themselves.

Other aspects of political acceptability There are no political problems.

Impact on users' door to door travel time The traveller would need to spend less time queuing to drop-off luggage or retrieving it from the carousel.

Impact on users' door to door travel cost The service increases the costs for the journey. Deutsche Bundesbahn charges €16.80 for each standard piece of luggage to be delivered within Germany with a surcharge of €7 if it goes to one of the German isles, to an airport or most of the destinations abroad on offer.

Initial impact on comfort or convenience For many people who use the services it is a huge improvement in convenience, and a service without which they would find travelling very difficult indeed.

Users' safety No impact is expected.

Personal security No impact is expected.

Access for people with reduced mobility This service is particularly attractive for people with reduced mobility.

5.4.5 Other Impacts

If the service attracts users who would otherwise have travelled by car or taxi, the resulting modal shift could reduce GHG emissions and, perhaps also congestion. Any reduction however would have to be offset by an increase in GHG emissions from the courier services that would pick up and deliver the luggage.

It has been suggested that this service adds to airline security risks because it results in unaccompanied bags being taken by plane. The risks however are similar to those faced when transporting small pieces of freight.

5.4.6 Examples

Deutsche Bundesbahn operates one such service through Hermes, a special service provider. They deliver door-to-door from any German address to any German address, to Austria, Luxembourg, France, Switzerland and Northern Italy, as well as to Frankfurt, Berlin-Tegel, Hamburg, Hannover, Leipzig/Halle and Munich/Erding airports.

Since 2007 Hermes Logistik Gruppe Reisegepäckservice and DGL Deutsche Gepäcklogistik have also operated their own services, which is not tied to any tickets.

Schweizer Bundesbahn offers a variant, which is the nearest proxy to a door-to-door service: Luggage can be checked in at a train station for the entire length of a rail trip and has to be picked up again at the train station of the final destination in Switzerland, France, Germany, Austria and Luxembourg. Also in this case the luggage has to be checked in two to three days before it can be picked up at the destination, although for 45 stations there is also a same day service (check in before 9:00 and pick up after 19:00).

5.5 FLIGHT LUGGAGE CHECK-IN AT TRAIN STATION

5.5.1 Description

A service whereby air passengers who are travelling to an airport by train can check in their luggage at the rail station where they board the train. This solution presupposes existence of at-station check-in (solution 5.1). A variant of this idea, which has been suggested in the literature, would allow

passengers to check-in their luggage on board the airport-bound train. However, post 9/11 security concerns and practical problems associated with the movement and securing of luggage on board the train persuade us that it would not be feasible solution.

5.5.2 Problems Addressed

Inconvenience of handling luggage on the way from the train to the airport check-in desk. Potentially long queues to check-in luggage at the airport.

5.5.3 Applicability

There needs to be an agreement between the train operator and the airline that secures the safe and tamperproof forwarding of the luggage from the station to the airline. This solution presupposes existence of at-station check-in (solution 5.1).

5.5.4 Performance

Cost There is no published data, but the main components are: (i) The set-up and operation of the check-in facility at the train station. (ii) A permanent customs officer throughout train operating times - where applicable. (iii) For each train, a tamperproof container for transporting the luggage to the train, and from the train to the hand-over point to airport staff. And (iv) A special express luggage sorting facility at the airport. It is difficult to estimate what this will cost altogether, but it seems quite possible that it would exceed €10 million in the first five years.

Technical feasibility Feasible using existing technology.

Financial feasibility It difficult to assess how financially feasible this services would be even if it successful in attracting: (1) New passengers to travel by train to the airport who would have travelled to the airport by train; (2) New passengers to fly from an airport served by the services, who might have otherwise flown from a different airport; and (3) New passengers to the airline which provides this service, who would have otherwise used a different airline. It is very likely that passengers would have to pay a premium to access the service.

Organisational feasibility The drop-off variant is organisationally feasible, even if not straightforward.

Acceptance by users User acceptability would be very high.

Other aspects of political acceptability None except the potential concern over security - see "Other Impacts" below.

Impact on users' door to door travel time Some reduction in time taken at the airport – there may be some overall saving depending on the deadlines applying for check-in at the airport and the minimum-connecting-times for intermodal transfer.

Impact on users' door to door travel cost This depends on whether this service is being charged for. In Switzerland for the journey home, the charge is CHF 20 per piece of luggage.

Initial impact on comfort or convenience This service provides a significant increase both in comfort and in convenience.

Users' safety No particular impact is expected.

Personal security No impact – provided that secure arrangements are in place to prevent luggage being tampered with before it reaches the secure area of the airport.

Access for people with reduced mobility It would improve access for people with reduced mobility who were accessing airports via public transport previously and who now can deposit their luggage much earlier in the journey.

5.5.5 Other Impacts

The existence of labelled baggage outside the main secure area of the airport raises some concerns about potential security risks threats. (AIRail's baggage services to Frankfurt Airport were terminated for this reason).

To the extent that this service would entice people to use the train on the way to the airport rather than drive there by car, it might create a modal shift and thereby reduce congestion and GHG emissions.

5.5.6 Examples

Vienna airport operates a full luggage check-in from the Vienna central station train station to the flight. Luggage can be checked in up to 24 hours before the flight.

Schweizer Bundesbahn operates the "Fly rail" service that transports luggage from many airports in the world via Geneva and Zürich airport to most Swiss train stations.

AIRail used to offer this service, but discontinued it because of security concerns.

5.6 EARLY ISSUE OF LUGGAGE LABELS

5.6.1 Description

This solution is relevant for passengers who check-in before arrival at the airport (either online or at a rail station or on board an airport-bound train - see Solutions 5.1 and 5.2 respectively). It involves provision of a luggage tag prior to arrival at the airport/station or a self service facility on arrival at the airport/station so that the luggage can simply be dropped off at a special location at the airport (possibly still within the train station).

5.6.2 Problems Addressed

Delays associated with luggage check-in at the airport.

5.6.3 Applicability

Wherever check-in is available online, at a rail station or on board a train heading for the airport (as described in Solutions 5.1 and 5.2).

5.6.4 Performance

Cost A special luggage drop-off facility must be provided, and staffed, at the airport. Tag printers would be required at out-of-airport check-in locations.

Technical feasibility Portable tag-printers are already available but it is not yet possible for ordinary passengers to print their own luggage tags and, until this is the case, ordinary passengers who check-in online would need to get their tags printed at one of the out-of-airport check-in facilities envisaged under Solutions 5.1 and 5.2.

Financial feasibility The possibility of charging a fee for this service could more than cover its limited costs.

Organisational feasibility Issues could arise in connection with overweight luggage because, even if tags were only issued to within-weight bags, there would be no way to prevent passengers from subsequently putting more items in their bags. This possibility might require bags to be reweighed when dropped off. If this was done before the bags are accepted at the drop-off point this would introduce a potential delay; if it were done subsequently, potentially complex arrangements would be required to surcharge passengers whose bags were overweight.

Acceptance by users Passengers with luggage to check-in are likely to value this service, though not as highly as the fuller luggage handling provided within Solution 5.5.

Other aspects of political acceptability No particular problems – but see “Other Impacts” below.

Impact on users’ door to door travel time Reduced delays to checked-in passengers associated with separate luggage check-in at the airport – although the need to visit a tag-issuing point might negate this saving for passengers who have checked-in online.

Impact on users’ door to door travel cost None unless a premium were charged for use of this service.

Initial impact on comfort or convenience Positive for passengers with luggage to check-in, but marginal or non-existent for passengers who have checked-in online who need to visit a tag-issuing point.

Users’ safety No particular impact is expected.

Personal security No particular problems – but see “Other Impacts” below.

Access for people with reduced mobility No particular impact is expected – except in so far as it can simplify the check-in procedure and reduce the distance for which bags must be carried.

5.6.5 Other Impacts

Issues would arise in connection with aircraft security. For example: the possibility of tags being lost and then attached to unauthorised luggage; the possibility that tag printers would get into unauthorised hands; the risks associated with pre-tagged luggage being in circulation outside airports in advance of flights.

5.6.6 Examples

KLM offers a self service luggage drop off that includes the printing off of luggage labels.⁵⁶

5.7 POST-FLIGHT LUGGAGE COLLECTION FROM LOCAL TRAIN STATION

5.7.1 Description

A service whereby air passengers’ luggage would be routed straight to the destination rail station without it having been “reclaimed” by the passenger at the airport. It would not be possible to guarantee that the luggage would be on the same train as the passenger (indeed, the passenger need not travel by train).

5.7.2 Problems Addressed

Delays experienced when reclaiming luggage at the airport (reclaim delays could occur at the destination station but, if the station is conveniently located, the passenger may find this less problematic than a delay at the airport); and the inconvenience of handling luggage from the airport.

5.7.3 Applicability

There needs to be an agreement between the train operator and the airline that secures the safe and tamperproof forwarding of the luggage from the airport to the station. Routing of luggage to the destination station is possible where regular customs checks are not thought to be a priority. Where this is an issue, a variant solution would require passengers to claim their baggage at the airport before passing through customs and re-checking it through to their final station (but this clearly loses a major benefit of the solution). This could be combined with Solution 5.5.

⁵⁶ https://www2.klm.com/travel/ae_en/about/news_press/travel_news/selfservice.htm

5.7.4 Performance

Cost The system would require staff and facilities at the airport, tamper-proof storage facilities on trains and staff and storage facilities at the destination station.

Technical feasibility Feasible using existing technology.

Financial feasibility It seems unlikely that this could cover its costs even if a charge was levied on passengers making use of it. However, some airlines and train companies might be prepared to subsidise the service if they thought it would result in an increase in passengers using their services.

Organisational feasibility Considerable logistical problems would need to be overcome and the possibilities for mistakes and misunderstandings are large.

Acceptance by users User acceptability would be very high – provided that the system does not get a reputation for “losing” luggage.

Other aspects of political acceptability No particular issues are envisaged.

Impact on users’ door to door travel time Some reduction in time at the arrival airport. But this is offset if it is necessary to make a special trip to collect the luggage.

Impact on users’ door to door travel cost This depends on whether this service is being charged for. In Switzerland for the journey home, the charge is CHF 20 per piece of luggage.

Initial impact on comfort or convenience This service provides a significant increase in comfort and convenience on the journey – but some passengers would find it inconvenient to have to make a special trip to pick up their luggage.

Users’ safety No particular impact is expected.

Personal security No particular impact is expected – provided that secure arrangements are in place to prevent luggage being tampered with.

Access for people with reduced mobility This service would assist people with reduced mobility by reducing the effort involved in carrying luggage.

5.7.5 Other Impacts

None – unless it entices people to use the train rather than car or taxi for the journey from the airport - and thereby reducing congestion and GHG emissions.

5.7.6 Examples

Widely available in Switzerland⁵⁷.

5.8 RFID TAGGING FOR LUGGAGE

5.8.1 Description

This involves the use of radio-frequency identification (RFID) chips embedded into luggage tags to ensure that luggage can be tracked much more effectively than the current system which uses labels with printed bar codes. The latter are prone to problems related to either the labels themselves (they cannot be read if not directly in sight of if damaged) and the reading scanners themselves (dirt obscures what they can read etc.). The use of RFID chips alleviates many of the problems experienced by printed labels and would be relevant for passengers who check-in before arrival at the

⁵⁷ <http://mct.sbb.ch/mct/en/reisemarkt/services/im-bahnhof/reisegepaeck/flyrail-baggage.htm?=> (last opened 1/02/11)

airport (either online or at a rail station or on board an airport-bound train - see Solutions 5.1, 5.2 and 5.6 respectively).

5.8.2 Problems Addressed

Delays associated with luggage check-in at the airport and locating luggage afterwards. It would also make a number of the solutions discussed in Section 5 much more effective since it would be easier to track luggage and so ensure its smooth passenger, be that to the luggage conveyer belt in baggage collection areas in airports or to the passengers home (as in solution 5.4).

5.8.3 Applicability

Wherever check-in of baggage is required, be that at an airport, a railways station or a port.

5.8.4 Performance

Cost The costs of installing a tailor made RFID luggage handling system are quite significant. For example the cost of Hong Kong's International Airport systems was \$50 million⁵⁸. In addition there is the cost of RFID tags which can cost around 5 times as much as a printed label (though this will fall with increased take up) plus the operational costs. It is unclear who would pay for the system, air passengers, operators, airports or a mix of both. Similarly it is unclear how much such as system would cost if it was applied to some of the solutions discussed in this section and/or applied to other modes of transport such as rail.

Technical feasibility This technology is already in use at a number of airports (e.g. Hong Kong International and McCarran International airport in Las Vegas).

Financial feasibility The possibility of charging a fee for this service could more than cover its limited costs.

Organisational feasibility Issues might arise if different FID standard are introduced. In order to combat this IATA has developed global standards for RFID baggage tags. This should encourage the uptake of the technology which needs to continue to ensure that luggage can be tracked effectively throughout its journey. Global standards would also have to be harmonised if RFID luggage systems was to cover more than one mode.

Acceptance by users Passengers with luggage to check-in are likely to value this service, not just for the assistance it will provide to the other solutions mentioned in this section but also for the ability of RFID to drastically reduce the occurrence of lost luggage.

Other aspects of political acceptability No particular problems.

Impact on users' door to door travel time Reduced delays to checked-in passengers associated with separate luggage check-in at the airport.

Impact on users' door to door travel cost None unless a premium were charged for use of this service.

Initial impact on comfort or convenience Positive for passengers with luggage to check-in.

Users' safety No particular impact is expected.

Personal security No particular problems.

Access for people with reduced mobility No particular impact is expected – except in so far as it can simplify the check-in procedure and reduce the distance for which bags must be carried.

⁵⁸ <http://www.wired.com/science/discoveries/news/2006/11/72181?currentPage=1> (last opened 1/02/11)

5.8.5 Other Impacts

5.8.6 Examples

A number of airports have introduced this system including Hong Kong International and McCarran International airport in Las Vegas, whilst Qantas has introduced the system for frequent flyer passengers travelling through Perth and Sydney (Terminal 3) airports (Q Bag Tags⁵⁹).

5.9 SELF-SERVICE LUGGAGE CHECK-IN AND DROP-OFF

5.9.1 Description

This involves the passenger checking in his own luggage and dropping it off without recourse to assistance from staff.

5.9.2 Problems Addressed

Delays associated with luggage check-in at the airport.

5.9.3 Applicability

Wherever check-in of baggage is required, be that at an airport, a railway station or a port.

5.9.4 Performance

Cost The costs of installing automatic luggage drop-off systems are not known but are likely to be significant.

Technical feasibility This technology is already in use at a number of airports (e.g. Schiphol and Dubai).

Financial feasibility Manufacturers of such system however point to the cost savings resulting from reduced staffing levels^{60 61}. This, together with increasing deployment of the systems by a number of airlines, (e.g.. KLM and Emirates) would suggest that the systems are able to pay for themselves over a number of years.

Organisational feasibility It would appear that automatic luggage drop off systems tend to differ by airport and that the national carrier appears to have exclusive use of such systems. Extending their use to other carriers may therefore be problematic.

Acceptance by users A sizeable number of passengers will accept this technology especially if they have a limited number of bags to check in. It may not appeal however to a number of passengers, especially the elderly, people with large numbers of cases and families travelling with children.

Other aspects of political acceptability No particular problems.

Impact on users' door to door travel time Reduced delays to checked-in passengers associated with separate luggage check-in at the airport.

Impact on users' door to door travel cost None unless a premium were charged for use of this service, however evidence so far would suggest that this is not the case.

⁵⁹ <http://www.qantas.com.au/travel/airlines/q-bag-tag/global/en> (last opened 1/02/11)

⁶⁰ <http://www.airport-int.com/article/iers-baggage-drop-solution.html> (last opened 1/02/11)

⁶¹ <http://www.bagdrop.com/> (last opened 1/02/11)

Initial impact on comfort or convenience Positive for some passengers with luggage to check-in. Other passengers will be ok with this as long as no premium is charged for not using this service.

Users' safety No particular impact is expected.

Personal security No particular problems.

Access for people with reduced mobility No particular impact is expected

5.9.5 Other Impacts

None identified.

5.9.6 Examples

A number of airports and airlines have introduced these systems including Schiphol (KLM) and Dubai (Emirates).

6 PRICING AND TICKETING SOLUTIONS

6.0 INTRODUCTION

This group of solutions concerns the provision of integrated pricing and/or ticketing for the individual components of long distance journeys. The idea being that this will make a multi-leg journey easier to understand, plan and execute. The general justification for providing “seamless” journeys is that it would reduce the effort involved in making such journeys.

Note that solutions which are primarily concerned with marketing or the provision of information about tickets and pricing, rather than with ticketing or pricing per se, are to be found in Section 7.

Stakeholders thought that Solutions 6.1 and 6.2 had particularly high potential to improve interconnectivity and were likely to yield the highest benefit/cost ratios.

The performance of these solutions is summarised in Table 1.5 and a more detailed description of each solution is presented below.

6.1 PRE-PAID TICKETS OR CARDS ALLOWING UNLIMITED LOCAL TRAVEL

6.1.1 Description

Pre-paid tickets, passes or smart cards to allow the user unlimited use of the local transport network (or a specified part of it) during a designated period (day, week, month, etc).

6.1.2 Problems Addressed

To avoid the potentially time-consuming process of buying individual tickets for each journey. The requirement to purchase separate tickets for each journey can be particularly onerous for visitors who do not know the location of the places where tickets can be bought and may be unsure of the type(s) of ticket(s) that can or should be purchased (part of the problem is solved by simplification of the tariff structure or by the provision of through tickets - as in Solutions 6.2 and 6.3 respectively – but visitors may still benefit from the provision of a ticket which allows unlimited travel). Boarding delays due to passengers purchasing tickets can also be reduced.

6.1.3 Applicability

This solution can be applied at the route, city or regional level.

6.1.4 Performance

Cost The costs of the implementing pre-paid tickets depend on the technology used – this can vary from conventional “paper” tickets to smart cards, or smartphone-based virtual tickets (see solutions 7.9 and 7.11 respectively). Whichever technology is applied, costs will be incurred in issuing cards/tickets, back office set up together with any settlement systems and ITSO costs. There is also a potential cost due to possible loss of revenue due to abuse.

Technical feasibility No problems.

Financial feasibility Will depend on the specific local conditions and particularly on the existing fare structure and demand (which will determine whether a suitably priced “unlimited travel” ticket would result in loss of revenue) and whether the scheme needs to involve multiple operators (and hence the costly complexity of any monitoring and settlement procedures).

Organisational feasibility Where more than one operator is involved, implementation requires institutional changes, close cooperation between stakeholders and public support. Operators may be reluctant if there is no system for fair reallocation of revenue or if there is a perceived risk of abuse by users.

Acceptance by users Likely to be high.

Other aspects of political acceptability No particular problems – other than reluctance of operators to become involved.

Impact on users' door to door travel time Should reduce travel time (less time taken to purchase tickets, boarding should be quicker).

Impact on users' door to door travel cost No particular impact is expected- unless a premium is charged to cover administrative costs and to dissuade abuse. It might also lead to a reduction in costs if the ticket is discounted and/or the traveller makes a sufficient number of journeys that brings the average cost per trip down to below the sum of those individual journeys if purchased separately.

Initial impact on comfort or convenience Such tickets are much more convenient for travellers.

Users' safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility No particular impact is expected

6.1.5 Other Impacts

None identified, except that, if the change attracts users who formerly used to travel by car or taxi, there could be resulting reductions in congestion and GHG emissions.

6.1.6 Examples

Many cities offer period passes – but many of them require people to purchase them at downtown locations.

In Germany the weekend special ticket is valid for the whole country and allows people to use all regional trains and many other public transport services all over Germany⁶².

In Switzerland, incoming passengers are offered tickets which cover unlimited travel from their port of entry en-route to their destination or passes for unlimited use of rail and bus networks for a specified period.

6.2 SIMPLE TARIFF STRUCTURE FOR LOCAL TRANSPORT SERVICES

6.2.1 Description

Provision of simple tariff structures for short public transport journeys in the origin or destination area.

6.2.2 Problems Addressed

Complexity of fare structure leading to time and effort being required to determine the correct ticket. This affects directly, the passengers who are unsure of the ticket type and indirectly, other passengers who experience boarding delays while former passengers talk to the driver to determine the correct ticket type. A complex fare structure may also dissuade some potential passengers from using local public transport.

⁶² http://www.vrr.de/de/tickets_und_tarife/ticketshop/index.html (last opened 1/02/11)

6.2.3 Applicability

Across all modes in a given area but most useful when current arrangements are complex – as might be the case if numerous service providers are involved.

6.2.4 Performance

Cost Introduction does not bear significant costs. The existing tariff structure is replaced by a simplified one. There is the possibility of savings on personnel training (no need to provide complex information on tariff types and zones serviced by different operators).

Technical feasibility No additional equipment is necessary.

Financial feasibility No financial impact in introduction phase but possible changes in revenue structure and total revenue streams in the medium to long term..

Organisational feasibility Significant problems arise when there are many service providers involved. Simple integration methods call for cross-acceptance of tickets but price of the ticket is highly dependent upon distance. There is a rationale behind a complicated tariff – it reflects certain phases of the transport process and is often left over from a previous fragmented service provision. Complexity of tariff reflects the organisational setup of transport process. Even when ticket and network integration is in place formerly separate companies are still responsible for particular sections. And in cases where no institutional coordination took place and only ticket integration has been achieved those companies are separate legal entities. Complicated tariff allows for easier revenue redistribution among members of the integrated transport zone.

Acceptance by users Users will welcome the simplified planning because it will make choices are easier (even published fare structures become easier to read). There will however be clear winner and losers with some users experiencing fares decreases and others, fares rises.

Other aspects of political acceptability Opposition may be expected from operators whose freedom to set fares may be reduced and from local communities whose fares will rise as part of the averaging process.

Impact on users' door to door travel time Saves time – as less need to seek additional information or ask clerks or driver for an explanation of the tariff. Boarding times may be considerably speeded up.

Impact on users' door to door travel cost Costs for long trips will tend to fall but those for short trips costs will tend to increase as simplification of tariff means that there are less zones but price has to be averaged. Also costs will fall for those who previously were not aware of the correct (cheapest) fare options.

Initial impact on comfort or convenience Increases convenience of use (more readable fare-tables, easier planning of journeys).

Users' safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility No particular impact is expected.

6.2.5 Other Impacts

None identified, except that, if the change attracts users who formerly used to travel by car or taxi, there could be resulting reductions in congestion and GHG emissions.

6.2.6 Examples

Simplification of tariff has been introduced in many regional (Strathclyde zonal structure⁶³) and city systems (e.g. Berlin's VBB zonal fare structure⁶⁴). The scale of simplification achieved varies. Simpler fare structures usually could be found in smaller regions (for instance the Pamplona region in Spain) while bigger areas involving more modes often make simplification impossible. In terms of big systems, Madrid could be regarded as an example of the successful introduction of tariff simplification while Warsaw could be regarded as an unsuccessful example.

6.3 PROVISION OF INTEGRATED TICKETS FOR LOCAL JOURNEYS

6.3.1 Description

Integrated ticketing for local journeys such that a single ticket allows travel on all possible routes within a given area. For example, if the pricing is based on zones, tickets will be valid for any combination of services which a passenger might use to reach their destination. This goes beyond the provision of a simple tariff structure (Solution 6.2) which might still require purchase of multiple tickets, but does not extend to include the long distance mode (Solutions 6.5 and 6.7). It may involve use of a smart card or of smartphone virtual ticket (Solutions 7.9 and 7.11 respectively).

6.3.2 Problems Addressed

Effort and time required to find out about, and purchase, the appropriate combination of individual tickets. Boarding delays due to passengers purchasing tickets.

6.3.3 Applicability

All public transport in a given area – but most useful when current arrangements are complex – as might be the case if numerous service providers are involved.

6.3.4 Performance

Cost The costs associated with changed accounting and financial management systems will be offset by the reduced cost of (multiple) conventional ticket sales.

Technical feasibility No significant barriers.

Financial feasibility No excessive costs are associated with the introduction of this solution. However, financial feasibility is not assured for participating partners if there is no efficient revenue allocation mechanism (see solution 8.13).

Organisational feasibility An appropriate system for distribution of ticket revenue between participating companies is required (see solution 8.13) together with appropriate capabilities in the accounting and financial departments of participating companies. Concerns over this issue could cause some partners to decline to be involved or to withdraw or cancel their participation on certain routes. The usefulness of the system is damaged if it does not involve 100% of the operators who are providing services.

Acceptance by users High acceptance. Users welcome simple seamless ticketing.

Other aspects of political acceptability Problems with participation of service providers who are subsidised by the State. In such cases a problem of subsidy redistribution (or its applicability to only originally subsidised company) emerges. City authorities' support will be required.

⁶³ <http://www.spt.co.uk/tickets/zonecard.aspx> (last opened 1/02/11)

⁶⁴ <http://www.bvg.de/index.php/en/17102/name/Tickets+%26+Fares.html> (last opened 1/02/11)

Impact on users' door to door travel time Potentially faster interchange as no need to purchase additional tickets if switching between transport modes or services. According to a British calculation, an average journey time saving per passenger of between 15 seconds and 1 minute could result.

Impact on users' door to door travel cost An integrated ticket should be cheaper than separate tickets for the same route, however, due to increased revenue demanded by participating operators, it is often more expensive than for a trip using non-integrated modes within same distance (see Solution 6.4).

Initial impact on comfort or convenience Convenience is much improved due to seamless travel and no requirement to buy tickets whilst switching either transport modes or services.

Users' safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility No particular impact is expected.

6.3.5 Other Impacts

None identified, except that, if the change attracts users who formerly used to travel by car or taxi, there could be resulting reductions in congestion and GHG emissions.

6.3.6 Examples

Common tariffs for integrated transport systems are often offered by metropolitan authorities, e.g. London, Paris, Madrid, Tricity (Gdansk, Sopot and Gdynia), Bolzano/Bozen, Lazio, Rome, Milan.

Several existing schemes demonstrate how integrated ticketing and technology can significantly improve the proposition of public transport to the customer. The Oyster scheme came into operation in 2003 and extends across the London Underground network, London buses, several boats and light rail services and some National Rail services that start or terminate in the city. The Oyster scheme has delivered very significant benefits since its introduction in terms of time savings, (Oyster has contributed to a significant reduction in queue times at ticket machines and the number of tickets dispensed by transport staff resulting in time savings for passengers and cost savings for operators).

The Técély card is an integrated smartcard which allows passengers the use of buses, trams and Metros in the city of Lyon and its suburbs. The same card can also be used to rent bikes through the Velo'v scheme, introduced into Lyon in May 2005.

Other non-smart cards include the Paris carnet⁶⁵ of metro and bus tickets and the Dutch strip cards which are in the process of being replaced by smart cards⁶⁶.

6.4 COMPETITIVE PRICING OF INTEGRATED TICKETS

6.4.1 Description

Integrated ticket priced no higher than the combined cost of separate tickets for the different modes for any trip within integrated network. Ideally the combined ticket should cost less than those it replaces but, given the additional convenience of the integrated ticket, this is not essential.

6.4.2 Problems Addressed

High cost for users.

⁶⁵ <http://europeforvisitors.com/paris/articles/paris-metro-tickets.htm> (last opened 1/02/11)

⁶⁶ <http://www.amsterdam.info/transport/strippenkaart/> (last opened 1/02/11)

6.4.3 Applicability

All interconnecting modes.

6.4.4 Performance

Cost Introduction of a competitive tariff does not incur additional costs *per se* (ticket distribution expenses are at the same level as when using any other tariff) but revenues may fall.

Technical feasibility Introduction does not require any extensive technical overhaul. Adjustments are needed in accounting departments and new software may be required.

Financial feasibility The tariff may result in reduced revenues from ticket sales. It is not known whether a more competitive tariff will create additional demand which will compensate for loss of revenue from lower price.

Organisational feasibility Participating service providers have to agree to the lower price of the ticket as well as an internal revenue distribution system between participating companies (see Solution 8.13).

Acceptance by users High acceptance due to guarantee of minimum cost.

Other aspects of political acceptability Some transport modes are owned and controlled by city authorities whilst other come under the control of national state owned companies or private enterprises. The kind of tariff discussed in this section requires pricing policy coordination between all the involved parties. Even if there is a political declaration of will, coordination of a tariff can be a challenge. With lower tariffs, revenues may be lower and this is unlikely to be acceptable to commercial operators – and similarly unacceptable to participating governments.

Impact on users' door to door travel time No particular impact is expected.

Impact on users' door to door travel cost Savings could be achieved.

Initial impact on comfort or convenience No particular impact is expected.

Users' safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility No particular impact is expected

6.4.5 Other Impacts

None identified, except that, if the change attracts users who formerly used to travel by car or taxi, there should be resulting reductions in congestion and GHG emissions.

6.4.6 Examples

Positive examples (lower integrated tariff than separate): London, Paris, Madrid. Negative examples (higher integrated tariff than separate): Tricity (Gdansk, Gdynia and Sopot), Silesia, Rome, Milan. The exact efficiency for the user often depends on the frequency of travel per day and the fare type selected by user. Under some fare types positive examples from above become negative and vice-versa. The examples above are based on average trips and do not cover all possible options.

6.5 INTEGRATED TICKETING FOR AIR AND RAIL & WITHIN MODE

6.5.1 Description

This relates to two levels of integrated ticketing, the first for air and rail services – such that a single ticket can be used for a journey involving both modes. Whilst the second level goes a further step and assumes that tickets are integrated between operators within modes.

6.5.2 Problems Addressed

Difficulties and inconveniences involved in making a journey involving a combination of air and rail services. Lack of transparency of the travel options and of the associated tariffs. Under-use of the relevant services⁶⁷. (see Solutions 3.1, 3.2, 3.3 and 3.4 for options for timetabling).

6.5.3 Applicability

In principle this could apply to all journeys involving combinations of rail and air.

6.5.4 Performance

Cost The introduction of integrated ticketing will incur administrative costs and will also involve some replacement or upgrade of ticketing machines, ticket-reading barriers etc. There would also be costs associated with achieving an appropriate distribution of revenues. A complete solution, involving integrated luggage handling would bring further costs (see Solution 5.2, etc) but are not considered here.

Technical feasibility There are no insurmountable technical problems.

Financial feasibility Depends on whether the integrated ticket generates sufficient additional demand, and hence revenue, to justify the additional costs. This in turn will depend on the extent of competition – particularly from mono-modal alternatives. Some users may be prepared to pay a premium for the increased convenience.

Organisational feasibility In order to assure the integrated ticketing at the first level, full cooperation between operators is clearly necessary. Such a framework could be reached either through voluntary engagement by the industry or through the introduction of a binding legal framework (see for example Solutions 8.2, 8.3 and 8.6). To achieve this at the second, higher level would be much more ambitious especially for the airline. There are examples of this occurring in other transport sectors such as buses and rail. In the airlines there are tacit alliances that allow passengers to travel on different airlines whilst making their journey however to extend that to any airline would be very difficult due to differences in air fares, baggage policy and loadings.

Acceptance by users According to a Eurobarometer survey on passengers' rights published on 1st July 2005, the vast majority of citizens would welcome a single ticket for international trips combining several transport modes.

Other aspects of political acceptability There are no significant political problems – provided that the operators are in favour of this development.

Impact on users' door to door travel time No significant impact is expected.

Impact on users' door to door travel cost Users may be required to pay a premium to cover the additional costs.

⁶⁷ Development of Integrated Ticketing for Air and Rail Transport Public consultation document of the European Commission services Directorate-General "Energy and Transport" http://ec.europa.eu/transport/air/consultations/doc/2008_09_30_ticketing_questionnaire.pdf (last opened 1/02/11)

Initial impact on comfort or convenience Integrated ticketing on Air-Rail has increased the comfort and convenience of intermodal travelling.

Users' safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility No particular impact is expected.

6.5.5 Other Impacts

None identified, except that, if the change attracts users who used to travel by car or taxi, there could be resulting reductions in congestion and GHG emissions.

6.5.6 Examples

There are four good examples of integrated ticketing between air and rail transport in Europe. They go beyond simple integration of ticketing to include integrated timetabling, marketing and, in some cases, services such as luggage transfer.

In January 2008 **Eurostar** completed a project called GDS3 which allows the display of its services in GDS's primary screens; Eurostar becomes thus 100% compatible with airline screen display and ticketing rules (including the IATA obligation to issue only electronic tickets). As of winter 2008, Eurostar services can also be proposed and sold in conjunction with flights using interline e-ticketing, via GDSs including Internet sites accessible to the public. Regarding integration between high speed and conventional rail, since 14 November 2007 integrated tickets are available from 138 British cities to Paris, Brussels and other destinations in France and Belgium.

Other European examples include Germany's **AIRail** and Switzerland's **Flugzug**. The German system connects Stuttgart and Cologne railway stations to Frankfurt airport, while the Swiss system connects Basle station to Zurich airport fourteen times per day. In both systems, the railway is considered by the airline like an extension of the flight and, consequently, the served railway stations receive a standard "airport" code which makes it possible to include them in air GDSs.

The service offered between Paris Charles de Gaulle (CDG) airport and Brussels (**Air France - Thalys**) does not involve a unique ticket, instead, the passenger buying an "integrated" air ticket receives a voucher to be exchanged against a train ticket before boarding the train. There is no luggage handling on the rail leg. SNCF (the French railways) also concluded an agreement with eight airlines enabling them to combine flights with rail journeys from Paris CDG airport to 19 French stations (TGV connections). Like for the "Air France-Thalys" service, passengers receive a voucher with their air ticket that has to be exchanged against a train ticket.

In terms of integrated ticketing within modes there are existing examples such as the UK rail passenger sector where a number of train operating companies (TOCs) accept tickets from other TOCs. Another very different example is the agreement reached between German and Polish national and local transport operators. The German national rail providers (DB) together with the Polish national rail operator (PKP) have signed agreements between themselves and local transport providers in Berlin (VBB) and in Warsaw (ZTM) to offer an integrated 'combiticket' for use in Berlin and Warsaw as well as the long haul rail link (the ticket is valid for 2 hours before boarding the train and 2 hours after disembarking from the train). The aim is to support integration between the two regions⁶⁸. A similar agreement has also been signed between Berlin and the Polish city of Szczecin⁶⁹.

⁶⁸ http://www.eltis.org/show_news.phtml?newsid=2153&mainID=461

⁶⁹ <http://www.berlin-stettin-ticket.de/>

6.6 PRE-BOOKED TICKET FOR PARKING AND PUBLIC TRANSPORT

6.6.1 Description

Provision of guaranteed spaces for cars whose drivers are transferring to pre-booked public transport. The car park ticket would be included as part of the public transport ticket – and might be free if the public transport cost is significant.

6.6.2 Problems Addressed

Facilitates combined use of car and public transport – with public transport being used either for the short distance leg (thus avoiding congestion and parking problems in a city) or for the long distance leg (with car being used as a feeder mode for longer distance public transport services). Differs from simple park and ride (see Solution 2.10) in that the service is available only to pre-booked passengers and includes a guaranteed parking space.

6.6.3 Applicability

Depending on the space available and the layout of the public transport station, but in principle this solution is applicable everywhere.

6.6.4 Performance

Cost Depends upon the size of the existing car parking area. In some case some additional work to prepare the existing parking area will be needed.

Technical feasibility No problems.

Financial feasibility Will depend on whether the parking area is free or whether special fees are to be introduced and whether additional usage of the car park generates additional income via rents from retailers attracted to the site.

Organisational feasibility No problems foreseen.

Acceptance by users Will depend upon the price and existing alternatives.

Other aspects of political acceptability There is no reason to expect political problems.

Impact on users' door to door travel time A minor reduction in travel times is achieved by avoiding the need for a separate transaction. A more significant saving may be achieved if drivers can be confident of obtaining a guaranteed parking space.

Impact on users' door to door travel cost It is likely that some premium would be charged for this service – but it might not be significant.

Initial impact on comfort or convenience It improves the comfort of intermodal travelling – particularly since guaranteed parking will reduce stress and anxiety.

Users' safety No effects expected.

Personal security A staffed or monitored car parking area can improve personal security for the car.

Access for people with reduced mobility A shortened path between the modes will improve access for people with reduced mobility.

6.6.5 Other Impacts

None identified, except that, if the change attracts users who formerly used to travel their entire journey by car, there could be resulting reductions in congestion and GHG emissions. This may be

tempered somewhat if the change attracts people who previously made the entire journey by public transport.

6.6.6 Examples

The city of Rotterdam has implemented a parking management system at the Rotterdam Alexander P&R site. By letting people without a valid public transport ticket pay for a parking place, the viability of parking spaces for public transport users was ensured.

6.7 INTEGRATED TICKETING FOR LONG-DISTANCE RAIL & LOCAL PUBLIC TRANSPORT

6.7.1 Description

Integrated ticketing which allows a person to make a journey involving transfers between long distance rail and local transport modes with a single ticket that is valid for the complete journey.

6.7.2 Problems Addressed

Difficulties experienced in finding out about, or purchasing tickets with which to complete the journey. Particularly important for visitors.

6.7.3 Applicability

Where the rail terminal is not conveniently located for the final destination, but where local public transport can fill that gap.

6.7.4 Performance

Cost It depends on the technology used. The total cost of the Rejsekort system in Denmark will be between €200 and €270 million, whilst the much simpler UK PlusBus system costs a fraction of this amount.

Technical feasibility Is given.

Financial feasibility Likely to generate profit through increases in demand. In case of Rejsekort A/S easier access and incentive pricing is expected to result in 5-10 % more journeys. The system will enable vastly improved journey statistics for planning and apportionment.

Organisational feasibility Deploying integrated ticketing for rail & local public transport requires a high-level of coordination and co-operation between all public transport providers and the rail service suppliers.

Acceptance by users User acceptability is high, when it makes travelling easier and cheaper.

Other aspects of political acceptability No particular issues.

Impact on users' door to door travel time Time savings may result from easier interchanges between local public transport and rail.

Impact on users' door to door travel cost There are no significant savings.

Initial impact on comfort or convenience Makes interchanging more seamless.

Users' safety No significant impact.

Personal security No particular impact is expected.

Access for people with reduced mobility No significant impact is expected.

6.7.5 Other Impacts

None identified, except that, if the change attracts users who formerly used to travel by car or taxi, there could be resulting reductions in congestion and GHG emissions.

6.7.6 Examples

Rejsekort is an electronic ticket system for public transport in Denmark. It will replace the current zone ticket system and cover trains, buses, and metro services. The one card will be valid all over the country and will be used in the same way everywhere. Fares will be calculated from the distance made from the beginning of the journey to the end, as the crow flies, so as to give a better correlation between price and distance travelled. The Rejsekort system was primarily tested between Roskilde and Tølløse in December 2007 testing between Taastrup and Holbæk at the end of 2008 rollout to paying customers between Taastrup and Holbæk at the start of 2009 South Zealand at the end of 2009. In 2010/2011 it is planned to extend the card to cover the Oresund region, which includes part of southern Sweden.

Krakow has performed a test of an integrated ticketing and tariff solution between the local public transport and the national railway. In order to integrate ticketing between railway and other transport modes negotiations were held between the City of Krakow, the local public transport operator and the national railway. From 1st of March 2008 the "**integrate ticket**" has been available to passengers travelling in the municipal ticketing zone by the municipal transport in Krakow and by trains on the Kraków-Krzeszowice line.

German examples include: **Mobility BahnCard 100** - a flat rate annual pass which, as of 2010, provides holders with free local public transport in more than 118 German cities when they purchase an ICE rail ticket; **City-Ticket / City Mobil** - single train tickets including public transport in 118 destination towns, is included at no extra cost to railcard holders but has to be paid for by other travellers; and **Länderticket** -one day passes (for 1 person or 5 people) for all regional trains and most public transport in a specific Federal State (or group of smaller States) in Germany.

The UK's **Plusbus** system allows rail passengers to obtain a discounted day bus pass at the origin and destination points of their journey. It is offered to rail passengers purchasing their ticket via the Internet.

In Switzerland, travellers can use their local tickets for short trips on long distance trains within the area of the specific transport association, e. g. the ICE trains between Basel SBB and Basel Bad Bf (Swiss and German Railway station at Basel), or the Eurocity trains between Munich and Zurich can be used with the local ticket of the Zurich Transport Association between Winterthur and Zurich.

6.8 INCLUSION OF LOCAL TAXI JOURNEYS IN RAIL OR AIR TICKETS

6.8.1 Description

Provision of rail or air tickets which cover the local taxi journey(s) associated with long distance trips by rail or air. The ticket price would be increased to reflect the length of the taxi-element.

6.8.2 Problems Addressed

Improves accessibility from poorly interconnected areas within cities. Simplifies the overall journey.

6.8.3 Applicability

Where there is no convenient public transport for the first or last leg of a long distance journey by rail or air.

6.8.4 Performance

Cost Costs of administration could be significant – particularly if the service includes a guarantee that a taxi would be available.

Technical feasibility No significant issues if taxi services are provided by competent taxi operators. However, since it would be unreasonable not to guarantee taxi availability for passengers who had pre-booked, there would need to be some means of co-ordinating taxi fleet operations with rail / airport operations. Passengers' local origin/destination points would have to be known in advance (in Vienna, passengers must book by 21:00 on the previous day).

Financial feasibility Wholly feasible if the taxi leg of the journey is provided by an existing taxi company and if the prices are no lower than the market rate without the integrated ticket. The costs of administration of an integrated ticket should be recovered via a premium paid by travellers.

Organisational feasibility Needs a cooperative agreement between rail/airport operator and private taxi companies (unless a dedicated taxi service is to be provided by the rail/airport operator – see Solution 3.10).

Acceptance by users Users are likely to appreciate the increased comfort and time savings and, if the taxi is guaranteed, the satisfaction and confidence associated with that. They are likely to be prepared to pay a premium for such a service and would doubtless be very happy if the rail or air operator managed to negotiate a below-market rate for the taxi journey.

Other aspects of political acceptability No particular issues.

Impact on users' door to door travel time No significant time saving relative to the use of conventional taxi but, if this service is used as a replacement for conventional public transport there could be substantial time savings due to the directness of the route and the avoidance of the in-journey stops which are characteristic of public transport.

Impact on users' door to door travel cost Likely to involve payment of a premium. Also, if provision of this service leads to the withdrawal of conventional services, costs for users are likely to rise because taxi services tend to be higher priced than local public transport. There may be a loss in low cost access if conventional public transport services were withdrawn due to competition from taxis.

Initial impact on comfort or convenience Taxi services are generally more comfortable than journeys by public transport - particularly those involving a change of service. Users are likely to find the guarantee of a taxi service for the final leg of their journey both comforting and relaxing.

Users' safety No significant impact.

Personal security No significant impact expected.

Access for people with reduced mobility This will improve as a guaranteed taxi option will bring reassurance to people with reduced mobility.

6.8.5 Other Impacts

The environmental effect could well be adverse if it results in generated taxi trips.

6.8.6 Examples

In Vienna the CAT-CAB system involves the City Airport Train which takes passenger on a non-stop journey from the heart of Vienna to the airport in only 16 minutes. Access to the train terminal is provided by taxis provided by the same operator⁷⁰.

⁷⁰ <http://www.cityairporttrain.com/> (last opened 1/02/11)

6.9 SMART CARDS

6.9.1 Description

An electronic ticket in the form of a smart card equipped with a memory chip to enable the use of a range of different transport services (and other services). The card can be re-loaded with credit or a new, pre-loaded, card can be purchased. The fare is deducted by swiping the card – or contactless reading from it. Potentially provides an end-to-end through travel ticket on one card.

6.9.2 Problems Addressed

Difficulties and inconvenience involved in purchasing local transport tickets when interchanging between modes (or operators).

6.9.3 Applicability

In the short term, smart card systems can be introduced wherever passenger numbers are sufficient to overcome relatively high costs of implementation and the business benefits are sufficient to incentivise operators to invest in card reading equipment. In the longer term, economies of scale should allow the introduction of such systems across regions, nations and internationally.

6.9.4 Performance

Cost High – implementation of the new system, both institutional and technical. Costs include installation of smartcard readers or other technologies on all buses and other vehicles of involved transport modes. Capital costs consist of equipment and systems required to support a smart ticketing system. The main elements are issuing cards, back office set up, settlement systems and ITSO costs.

Technical feasibility No problems, technical solutions already exist for most of the anticipated problems, though it should be noted that the required functionality depends on local circumstances - when used in a deregulated bus market, cards must be capable of storing operator only and multi-operators tickets in urban public transport.

Financial feasibility Due to high costs it depends on the specific conditions, area of implementations, existing demand, organisational framework etc. Financial feasibility may depend on being able to share the costs with other, non-transport, organisations (retailers, service providers, banks).

Organisational feasibility Implementation of the smart card requires some institutional changes, close cooperation between stakeholders and public support. When used in a deregulated bus market, the back office functions for revenue allocation may be quite complex.

Acceptance by users Highly accepted.

Other aspects of political acceptability Generally no problems with political acceptability, the smart card system in transport could be even treated as a spectacular transport policy measure to be implemented with the support of public authorities.

Impact on users' door to door travel time Widespread use of smart cards can reduce boarding times considerably (compared to a cash fare regime requiring interaction with the driver). Boarding time savings are achieved if the system avoids the need to interact with the driver or to queue to swipe in or swipe out (simply using the card as a stored value device will produce only modest savings in boarding time if an interaction with the driver is still required).

Impact on users' door to door travel cost No particular impact is expected – but passengers may benefit if operating cost savings are passed on to them in the form of lower fares - and individual travellers may benefit from “smart” offers (such as London Oystercard’s guarantee that daily expenditure on a given card will not exceed the cost of the best available day ticket).

Initial impact on comfort or convenience Smart cards facilitate much more convenient trip-making.

Users' safety No particular impact is expected.

Personal security No particular impact is expected – but it is noted that vulnerable people (e.g. children) may be less at risk from theft – particularly if a stolen card can be cancelled.

Access for people with reduced mobility Fewer problems involved with ticket purchase.

6.9.5 Other Impacts

If the change attracts users who formerly used to travel by car or taxi, there could be resulting reductions in congestion and GHG emissions.

The introduction of smart cards can provide highly accurate passenger-trip information which can be used for patronage monitoring, marketing and network planning – but the data is of limited value unless passengers are required to swipe in and out (e.g. in a fully gated system) – if the system does not require swipe in and out then the data can only relate to boardings (if swipe-in) or alightings (if swipe-out) but cannot reveal the origin destination matrix.

Use of a smart card can remove the stigma sometimes associated with using a card to access a concessionary fare (a third party observing someone using a smart card cannot see if it entitles the user to a concessionary fare).

6.9.6 Examples

OV-chipkaart in the Netherlands - Trans Link Systems was established by the five largest Dutch public transport companies to implement a single payment system for public transport. It covers the whole country.

The **Oyster card** is a form of electronic ticketing used on public transport services within the Greater London area of the United Kingdom. It is promoted by Transport for London (TfL) and is valid on a number of different travel systems across London including London Underground, London buses, the Docklands Light Rail and Overground rail services. TfL has introduced zonal fares and does not accept cash payment on board buses. Oystercard fares are lower than the cash equivalent. This has been an incentive for passengers to switch away from cash – as has the fact that the daily expenditures on the Oystercard is guaranteed not to exceed the price of the best available day ticket.

Opencard in Prague - Prague Public Transport Season Ticket and Payment for Parking in Prague, it is valid for all zones of the Prague Integrated Transport System (PID).

YTV Greater Helsinki card - The Helsinki Metropolitan Area Council currently manages the following zones: Helsinki, Espoo and Kauniainen, Vantaa, Regional traffic 1: Helsinki, Espoo, Kauniainen and Vantaa, Regional traffic 2: Espoo, Kauniainen, Vantaa, Kerava and Kirkkonummi (excluding Helsinki) and Entire region: Helsinki, Espoo, Kauniainen, Vantaa, Kerava and Kirkkonummi.

6.10 PAYMENT VIA MOBILE TELEPHONE TEXT MESSAGES

6.10.1 Description

Purchase and confirmation of local transport tickets via mobile phone. The cost of the ticket is included in the cost of the call charged by telephone operator. Purchase and confirmation are via SMS messages. The confirmation message is sent back within seconds and includes security codes and other information (date/hour/operator/value) which can be checked on board the vehicle. The on-board validation can be via: a visual check by staff; a scan using a special device; or a free call from the passenger's mobile during the inspection which generates a message which is sent to a device carried by the inspector.

6.10.2 Problems Addressed

The time consuming and, for visitors, sometimes difficult process of purchasing local transport tickets.

6.10.3 Applicability

Widespread. Solution especially applicable for local public transport systems which include many modes and where dedicated ticket offices, or even just ticket machines, are not justified at main ports of entry.

6.10.4 Performance

Cost No significant additional cost for user – ticket price purchased via mobile phone message is the same as paper ticket (or with a small premium). Unavoidable costs to operator include back office operations and settlement systems. Although the system can function without any on board equipment, it can be upgraded to include devices on board the vehicles (fixed or carried by inspectors) to read the SMS messages or receive confirmation calls to verify the ticket.

Technical feasibility A need for a mobile phone network – with good reception at the interchanges and, if inspection is to be more than just visual, on board the vehicles. Foreign visitors arriving at particular destination would need to own a mobile phone recognised by the local operator. The area would have to be covered by telecommunication infrastructure of all mobile phone providers operating within a given country to maintain non-discriminatory access.

Financial feasibility Costs for the operators are transfers to mobile phone operators which have to be made from ticket revenue. Premium on price of the ticket could cover the additional costs (if not already covered by the “normal” commission on SMS messages).

Organisational feasibility Special agreements between telephone companies and transport providers have to be signed. Service providers might be reluctant to use this tool as there is a possibility of fraud by hacking SMS messages and because it can be more difficult to check that passengers have valid tickets.

Acceptance by users Acceptance varies; for instance in Prague, average use is at 20,000 users per month. It is estimated that 60% of users are those who had not previously purchased tickets at all. But in other cases users have found the system too complicated and, since “normal” tickets are widely available, there is no incentive to use mobile phone tickets. Passengers have a fear and reluctance to use the new style tickets and, according to recent market research in Szczecin and Poznan, they feel that the information disseminated about how to use them has been poor.

Other aspects of political acceptability No obstacles from the political side – on the contrary, “innovative” technological solutions often attract political support.

Impact on users’ door to door travel time Saves time because tickets can be purchased while engaged in some other task. Also reduced boarding times because other travellers will already have tickets necessary for ticket purchases. Can also facilitate seamless travel. No need to look for ticket sale offices on switching from one mode to the other

Impact on users’ door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience Improves the convenience of travelling since you can buy your ticket at any point.

Users’ safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility Likely to improve access as there is no need to physically buy paper tickets in often poorly accessible physical facilities.

6.10.5 Other Impacts

If the change attracts users who formerly used to travel by car or taxi, there could be resulting reductions in congestion and GHG emissions.

The technology could provide more accurate passenger-trip information which can be used for patronage monitoring, marketing and network planning.

This type of technology will help to promote a “modern” image for cities which support it.

6.10.6 Examples

Poznan, Szczecin (**mobilet** and **mPay**⁷¹), Sweden⁷², Prague⁷³, Helsinki, and Rome. GEAR⁷⁴ is a complete platform for creating, delivering and validating mobile-tickets. It is in use in Italy and offers a comprehensive platform for mobile-ticketing in partnership with major players in the industry.

Masabi⁷⁵ is another system working in the UK. It is user-friendly mobile ticketing software for everyday mobile phones which allows travellers to select, purchase and display train tickets on their mobile phone. The application is compatible with 90% of phones in use in the UK and secures all transactions with the same level of encryption used in internet banking. Masabi partners with established systems integrators like Atos Origin and currently supplies live services for the use of UK rail operators including Heathrow Express and East Coast Main Line (a government-run rail operator). In December 2008 the company's design for mobile barcodes was adopted as a national standard by all UK rail operating companies (ATOC).

6.11 VIRTUAL TICKETS ON SMART PHONES

6.11.1 Description

Provision of integrated tickets through smartphones. Through this technology, mobile phones act as “virtual tickets” via an “app” which allows credit to be deducted from the user's account when the phone is held close to a reader/transmitter. Details of the transaction are stored on the phone so that a ticket inspector can verify that a payment was made. Requests are processed within a minute and the customer receives a confirmation, which functions as a ticket.

Additionally the customer can check his personal purchase at the special website. Additional smartphone functions can also allow the consumer to access the best itinerary and then purchase a ticket via the application. Differs from SMS tickets (Solution 7.10) in that it offers the possibility of stored value “tickets” and a higher level of ticket security.

Further levels could be added such as encapsulating all tickets for the different modes that form part of the journey into a single electronic transport document.

6.11.2 Problems Addressed

Difficulties and inconveniences involved in buying “physical” tickets or smart cards – particularly if the intending passenger is a visitor without easy access to ticket offices.

6.11.3 Applicability

All interconnecting modes.

⁷¹ http://www.mobilet.pl/komunikacja_06.htm (last opened 1/02/11)

⁷² <http://mobill.se/Services/SMSTicket/tabid/163/language/sv-SE/Default.aspx> (last opened 1/02/11)

⁷³ <http://www.radio.cz/en/article/97845> (last opened 1/02/11)

⁷⁴ <http://www.gear.it/>

⁷⁵ <http://www.masabi.com/tour/about/> (last opened 1/02/11)

6.11.4 Performance

Cost Will require investment in back office functions and settlement systems. Non-trivial investment in on-board scanner devices may be required.

Technical feasibility Mobile ticketing will be a commonly used function in future smartphones.

Financial feasibility The costs of scanners would have to be recouped via a small premium on the price. End users would pay for their own phones. The App might be provided free (the providers of the system might deduct a percentage of all transactions).

Organisational feasibility Cooperative agreements between mobile phones operators and transport operators will be required.

Acceptance by users High acceptance provided that “conventional” tickets are still available (some users will not like using the new technology)

Other aspects of political acceptability No particular issues.

Impact on users’ door to door travel time Faster interchange due to no need to purchase additional tickets in between switching modes and also faster boarding times because other passengers are not having to purchase tickets.

Impact on users’ door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience Convenience is improved due to seamless travel and no need to buy tickets while switching from one mode to the other. This benefit is further increased if the same technology can be used for self-service reservation, ticketing and check-in for services operated by all operators and if it can also be used for other travel-related services such as the reservation of accommodation.

Users’ safety No significant impact.

Personal security No particular impact is expected.

Access for people with reduced mobility Likely to improve access as there is no need to physically buy paper tickets in often poorly accessible physical facilities.

6.11.5 Other Impacts

If the change attracts users who formerly used to travel by car or taxi, there could be some resulting reductions in congestion and GHG emissions.

Implementation of the technology would provide a useful source of passenger data which can be used for patronage monitoring, marketing and network planning.

This type of technology will help to promote a “modern” image for cities that support it.

6.11.6 Examples

Visa’s New York subway test program to allow users to pay for travel using smart phones.⁷⁶

⁷⁶ http://ecommerce-journal.com/news/29798_visa%E2%80%99s-probing-subway-tickets-payments-smartphone (last opened 1/02/11)

7 SOLUTIONS INVOLVING MARKETING, INFORMATION AND SALES

7.0 INTRODUCTION

This group of solutions concern the marketing of the components of long distance journeys. It includes branding, the provision of information and new sales channels. The idea being that this will make a multi-leg journey easier to plan and execute and will help users identify and access the most appropriate options for their journey.

Stakeholders thought that Solution 7.1 had particularly high potential to improve interconnectivity and that it was likely to yield the highest benefit/cost ratio.

The performance of these solutions is summarised in Table 1.6 and a more detailed description of each solution is presented below

7.1 COMMON INFORMATION DESIGN GUIDELINES ACROSS OPERATORS

7.1.1 Description

Development of best practice and standard design/content guidelines to ensure consistency of information between multiple operators (examples might include: the use of agreed pictograms which can be understood by visitors unable to read the local language; standardised formats for timetable information; standardised names for destinations, types of ticket, categories of passenger, etc). This measure is focussed on ensuring a certain degree of uniformity in information/marketing design and content but (unlike Solution 7.2) does not require individual operators to give up or diminish their own brand.

7.1.2 Problems Addressed

Inconsistent approaches to information provided by different operators making it difficult for travellers to understand the information being provided and to recognise opportunities for multi-modal trips. This is associated with the fragmented nature of the operating environments within which long distance intermodal journeys take place. Although the operator of each alternative connecting service will often do its best to market their services, this can easily lead to information overload and confusion

7.1.3 Applicability

A strong regulatory environment is often seen as critical for the effective provision of information through the setting of common standards and requirements, the development and maintenance of central information databases and the provision of impartial information to the public. While in a local transport context it could be expected that dominant operators take the lead on several of these tasks, some form of higher level regulation is likely to be critical for intermodal long distance travel.

Yet, because of the very nature of intermodal long distance travel developing an appropriate institutional framework has generally proven to be an insurmountable challenge. This is easiest to understand if we consider a trip between two different countries using air as the main mode, but relying on an intercity rail service at the origin and a local bus service at the destination. In this example, the passenger starts by using a rail service provided by a national operator, possibly regulated by the Ministry of Transport. She will then need to navigate through a rail station, operated by the rail infrastructure manager, and an airport, operated by the airport authority and regulated by a separate national agency. She will then board a plane run by an airline regulated by an international agency and repeat the reverse process upon arrival at the destination airport, except that each station and service will again be run by a different operator regulated by a different national agency. At the local level, in particular, it is likely that bus services will be regulated by local transport authorities with a narrowly defined remit not extending much beyond their municipal boundaries. So if the airport is outside that boundary the passenger may find herself faced with yet further inconsistency in the type of information provided there and at the final destination station.

But barriers to consistent information and marketing can be found even within a single country and mode. A good example is the **UK rail system** where services are operated by more than 20 different companies who are allowed to, and to some extent, encouraged to develop their own brand and marketing strategy. Operators will, quite naturally, give more priority to publicising their own services than interconnected services for which they will receive only a share of the revenue. Also, they may not wish to compromise their own brand image by allowing it to be diluted by association with a joint venture with another provider. As a result passengers are exposed to inconsistent or incomplete information and marketing messages as each operator strives to differentiate its service and promote a distinctive brand. Since intermodal traffic typically represents only a small proportion of each individual operator's demand their marketing will be tailored to their core market, their particular priorities and operating practices.

7.1.4 Performance

Cost Is likely to increase with the number of different operators involved. Costs considered include, on the one hand, those associated to the running of a joint working group, development and agreement of common guidelines, and, on the other, to the re-design and production of marketing and information materials. However, there are likely to be savings in the longer term as each operator will be able to reduce its costs in producing original material.

Technical feasibility No significant hurdles.

Financial feasibility Likely to generate profit through increases in demand. However, it is a significant challenge to put a number to the valuation of such soft factors. A conservative estimate of the potential long term increase in demand would be in the range 1% - 5%.

Organisational feasibility There is likely to be some opposition from individual operators as they see their own marketing strategy as a key asset and a way to differentiate themselves against competitors. However, unlike Solution 7.2., this measure does not require individual operators to diminish their own brand so it is likely to be better accepted. Indeed, recent experience in the UK context suggests that operators are able to work effectively in partnership when they are made aware of the potential benefits.

Acceptance by users The main purpose of this measure is to remove unnecessary complexity in order to make journeys simpler for users so this is likely to be a popular measure.

Other aspects of political feasibility No problems are foreseen – except perhaps if well known national brands are at stake.

Impact on users' door to door travel time No impact is envisaged - except in reduced time finding out about onward connections.

Impact on users' door to door travel cost No significant effect is envisaged.

Comfort and convenience The whole purpose of this measure is to remove unnecessary complexity in order to make journeys simpler for users.

Users' Safety No impact is envisaged.

Personal security No impact is envisaged.

Access for people with reduced mobility Any measure that reduces the cognitive and affective effort required for information acquisition is likely to have a positive impact on travellers with disabilities.

7.1.5 Other Impacts

Small positive environmental impact may be expected if passengers are encouraged to switch from car or taxi to public transport.

More uniform marketing and information is likely to increase the passengers' perception of the region and might thus enhance its prestige.

7.1.6 Examples

Recognising the often conflicting practices followed within the industry and of the importance of high quality information in increasing passenger confidence, the UK Association of Train Operating Companies (ATOC), in partnership with the infrastructure manager (Network Rail) and passenger representatives (Passenger Focus), set up a **Passenger Information Strategy Group**, with the stated aim to: "(...) *provide timely, relevant, accurate and consistent information – easily understandable and accessible wherever, whenever and however required (...)*". The most visible outcome of this partnership was the development of a **"Good Practice Guide for providing information to passengers"**, first published in 2007 and subsequently reviewed at yearly intervals⁷⁷. This document sets out mandatory and advisory guidelines covering information off station (pre-trip), on station (wayside) and on train (on-board), which train operating companies are now expected to follow.

Some examples of the types of mandatory guidelines put forward include:

- 'Continuing your journey posters' must conform to national design standard, e.g. alphabetical list of local destinations served by buses with bus route numbers/names;
- Directions to local buses and express coach services that operate between airport and other rail stations must be clearly signed;
- Symbols used in printed timetables must be the same as used in National Rail timetable;
- Standard format must be used for displaying fares on journey planner/ticketing websites.

However, it is interesting to note that while content, symbols and phrasing are standardised design details (e.g.: colour, contrast, font and size) are left for individual operators to choose (thereby maintaining their unique brand). This, it could be argued, largely defeats the point of standard information guidelines as these design details are what passengers rely upon as cues to the type of information contained therein.

This example suggests that successful partnership working can lead to significant improvements in the provision of intermodal information and marketing even in complex and fragmented institutional environments. Lyons et al. (2001)⁷⁸ suggest that flexible and voluntary partnerships of this sort can allow institutional and jurisdictional barriers to be overcome more easily than more formal agreements involving industry regulators. However, it would appear that for individual operators to agree to concessions with respect to their individual brand there needs to be a clear underlying business case.

7.2 UNIFORM BRANDING AND MARKETING ACROSS OPERATORS

7.2.1 Description

Incorporation of the services provided by distinct yet complementary operators under the umbrella of a single brand, marketing strategy and information channel. Although individual operators may retain their individual brand and most of their marketing functions, it is envisaged that the collective brand is given more prominence (see Solution 7.1 for a less ambitious variant which simply ensures a common approach to information provision).

⁷⁷ ATOC (2009) "Good Practice Guide for providing information to passengers", Association of Train Operating Companies, London, UK.

⁷⁸ Lyons, G., Harman, R., Austin, J., Duff, A. (2001). *Traveller Information Systems Research: A Review and Recommendations for Transport Direct*. Prepared for the UK Department for Transport, Local Government and the Regions, London, <http://webarchive.nationalarchives.gov.uk/+/http://www.dft.gov.uk/adobepdf/245385/249577/tisr> (last opened 1/02/11)

7.2.2 Problems Addressed

Additional anxiety and cognitive effort expended while obtaining and processing unfamiliar information is heightened by the use of distinct marketing tools by complementary operators.

7.2.3 Applicability

Because of the very nature of intermodal long distance travel passengers may be exposed to a multiplicity of brands and marketing messages even when travelling on what are perceived to be essentially complementary services (e.g. local and high speed rail services, rail and air services, local and long haul flights). However, operators may see each other as competitors and give significant priority to developing their own individual brand and marketing strategy. As a result they are unlikely to be willing to compromise their own brand image by allowing it to be diluted by association with a joint venture with another provider or providers. As a result passengers are exposed to inconsistent or incomplete information and marketing messages as each operator strives to differentiate its service and promote a distinctive brand. Since intermodal traffic typically represents only a small proportion of each individual operator's demand their marketing will be tailored to their core market, their particular priorities and operating practices. To persuade operators to implement this type of measure it is critical to demonstrate that the benefits from more uniform marketing outweigh any potential disadvantages from brand dilution.

7.2.4 Performance

Cost Assuming that individual operators have already established large, well known brands, this measure may actually be relatively costly in order to be effective (€1-10 million) as it will be necessary to invest in a whole new branding exercise and marketing strategy. There may also be additional costs associated to the provision of joint information and ticketing services. Part of the initial investment can be divided between operators and so the amount required from each operator depends on the number involved.

Technical feasibility No significant hurdles.

Financial feasibility Likely to generate profit through increases in demand. However, it is a significant challenge to put a number to the valuation of such soft factors. A conservative estimate of the potential long term increase in demand would be in the range 3% - 8%.

Organisational feasibility There is likely to be some opposition from individual operators as they see their own marketing strategy and brand as a key asset and a way to differentiate themselves against potential competitors. This type of measure is likely to face least opposition when operators are clearly perceived to provide complementary services.

Acceptance by users The main purpose of this measure is to remove unnecessary complexity in order to make journeys simpler for users so it is likely to be popular.

Other aspects of political acceptance No problems are foreseen – except perhaps if well known national brands are at stake.

Impact on users' door to door travel time No impact is envisaged.

Impact on users' door to door travel cost No significant effect is envisaged.

Comfort and convenience The purpose of this measure is to remove unnecessary complexity in order to make journeys simpler for users.

Users' Safety No impact is envisaged.

Personal security No impact is envisaged.

Access for people with reduced mobility Any measure that reduces the cognitive and affective effort required for information acquisition is likely to have a positive impact on travellers with disabilities.

7.2.5 Other Impacts

Small positive environmental impact may be expected if passengers are encouraged to switch from car or taxi to public transport.

More uniform marketing and information is likely to increase the passengers' perception of the region and might thus enhance its prestige.

7.2.6 Examples

The issues faced by UK rail passengers in terms of inconsistent marketing and information provision (see Solution 7.1) can also be found on the **European high speed rail network** where each operator (e.g.: TGV, Thalys, Eurostar, Eurostar Italia, AVE, TAV, ICE, Fyra) prides itself on its distinctive brand, therefore passing on to the passenger an idea of fragmentation as opposed to integration. A number of these operators have identified the multiplicity of brands and fragmented information sources as a potential barrier to greater system usage and, in response, have formed the **Railteam consortium**. One of its main stated objectives is to improve travel information through: "Easier access to schedules, availability and purchase information; multi-lingual services on board, before and after [the] journey; and Railteam Information Points and services in major stations". This example suggests that successful partnership working can lead to significant improvements in the provision of intermodal information and marketing even in complex and fragmented institutional environments. Lyons et al. (2001)⁷⁹ suggest that flexible and voluntary partnerships of this sort can allow institutional and jurisdictional barriers to be overcome more easily than more formal agreements involving industry regulators. However, it would appear that for individual operators to agree to concessions with respect to their individual brand there needs to be a clear underlying business case.

Another good example is the **AIRail** service connecting Cologne and Stuttgart with **Frankfurt-Main Airport**. Although this relies on the ICE high speed rail service run by DB, it is marketed by Lufthansa as a fully integrated component of its service creating the concept of a '**single journey**'. Neither the ICE nor the DB logos are used on the Lufthansa website, the service can be booked together with flights (rail stations have their own three letter code similar to airports), check-in can be done at the rail station or the airport and frequent travelers can earn air miles on the surface portion of the journey.

Lufthansa also advertises dedicated airport bus services on its website under the **Lufthansa Airport Bus** brand. Tickets can be purchased together with flights and routing information is also available. Although most of these services are actually operated by different companies Lufthansa's marketing strategy gives the passenger the sense and security of a single journey.

7.3 PRE-TRIP MARKETING OF CONNECTING SERVICES

7.3.1 Description

Improved marketing of connecting services through the operator of the main leg of the journey. This would usually involve marketing and providing journey planning information about connecting services at the booking or trip planning stages. This may involve setting up some form of partnership between the main operator/relevant travel agents and those providing connecting services.

⁷⁹ Lyons, G., Harman, R., Austin, J., Duff, A. (2001). *Traveller Information Systems Research: A Review and Recommendations for Transport Direct*. Prepared for the UK Department for Transport, Local Government and the Regions, London, (<http://webarchive.nationalarchives.gov.uk/+/http://www.dft.gov.uk/adobepdf/245385/249577/tisr>) (last opened 1/02/11)

7.3.2 Problems Addressed

Many passengers bypass journey planners altogether and book their journey directly with the main operator they wish to travel with (for example, a high speed rail operator or an air carrier who may be the only providers travelling between a given city pair). However, since connecting services are usually provided by a different operator, there is significant difficulty in obtaining relevant information at that stage or even in becoming aware of the alternatives available.

7.3.3 Applicability

Long distance operators, travel agents. Many sources of information deal only with a subset of the modes and services required to complete the journey. For example, many travel agents will have no knowledge of local bus services linking an airport to the local city and are unlikely to be able to sell tickets for such services in conjunction with an air ticket. Similarly, most internet-based journey planners deal only with a single mode. This may be because they cannot earn any commission from sale of the “local” tickets”, or because of institutional and technical barriers involved in accessing such information.

However, operators and infrastructure managers will, quite naturally, give more priority to publicising their own services than local connecting services for which they will receive no revenue. Local operators, on the other hand, may be reluctant to compromise their own brand image by allowing it to be diluted by association with a joint venture with another provider or group of providers. In fact, in many cases, operators may have worked very hard to establish an instantly recognisable brand and may see their greatest asset in attracting demand. As a result passengers are often unaware of the best connecting services available at the journey planning stage and may as a result choose the default alternative to rent a car or hire a taxi, or in some cases, choose an alternative main mode of travel.

Although many airports have dedicated bus and rail airport services, few are marketed effectively at the pre-trip stage. Ideally, information about connecting services should be provided at the point where passengers book or seek information about the main portion of the journey (journey planner, travel agent or directly with operator). In practice, this is rarely the case. Where information exists it is passively listed on airport websites overlooking the fact that most passengers are unaware that the airport is a separate service provider to the airline or travel agent. Most examples of effective marketing of connecting services are promoted by the connecting operators themselves making it difficult for information to get to passengers at the pre-trip stage. Moreover, the lack of a consistent and integrated marketing approach to connecting services can lead to a very crowded market, which is confusing to passengers.

7.3.4 Performance

Cost Set up and variable costs are likely to be low (<€1m).

Technical feasibility No significant hurdles.

Financial feasibility May generate profit through increases in demand. However, it is difficult estimating the value of such soft factors. The effect is likely to be small given the number of passengers potentially affected (i.e. those who are unaware of connecting services through some other source of information and who would change their behaviour as a result). A conservative estimate would be somewhere around 1% growth in demand.

Organisational feasibility Main operators may consider this measure a waste of effort as it is aimed at persuading their own passengers to use the services of a different operator. However, this measure can actually contribute to increase main operator demand by widening catchment areas and attracting new demand segments, so it is likely initial opposition can be overcome. This measure also relies on effective partnerships being developed between operators - which can sometimes be a challenging task.

Acceptance by users This measure aims to give passengers improved intermodal information close to the point of use so it is likely to be popular amongst users.

Impact on users' door to door travel time This type of measure may have a considerable impact on travel time by informing passengers of an alternative connecting mode or service they may have been unaware of.

Impact on users' door to door travel cost This type of measure may have a considerable impact on travel cost by informing passengers of an alternative cheaper service they may have been unaware of. For example, an existing connecting public transport service may prove considerably cheaper and, often, just as quick as a taxi service.

Comfort and convenience There is likely to be some reduction in the level of uncertainty and anxiety experienced by passengers thereby making the travel experience more enjoyable. By eliminating the need to obtain and combine information from a range of different sources this measure is also likely to make intermodal journey planning more convenient.

Users' Safety No impact is envisaged.

Personal security No impact is envisaged.

Access for people with reduced mobility Any measure that reduces the cognitive and affective effort required for information acquisition is likely to have a positive impact on travellers with disabilities.

7.3.5 Other Impacts

Small positive environmental impact may be expected if passengers are encouraged to switch from car or taxi to public transport.

7.3.6 Examples

A well known example of pre-trip marketing is the **AlRail** service connecting Cologne and Stuttgart with Frankfurt-Main Airport. Although this relies on the ICE high speed rail service run by DB, it is marketed by Lufthansa as a fully integrated component of its service creating the 'rail & fly concept'⁸⁰). Neither the ICE nor the DB logos are used on the Lufthansa website, the service can be booked together with flights (rail stations have their own three letter code similar to airports), check-in can be done at the rail station or the airport and frequent travelers can earn air miles on the surface portion of the journey.

Lufthansa also advertises dedicated airport bus services on its website under the **Lufthansa Airport Bus** brand. Tickets can be purchased together with flights and routing information is also available. Although most of these services are actually operated by different companies, Lufthansa's marketing strategy gives the passenger the sense and security of a single journey.

Oslo (**Flytoget** and **Flybussen**) and Heathrow (**Heathrow Express**, **Heathrow Connect**, **RailAir**, the **Airline**) airports are generally regarded as good examples of pre-trip marketing of connecting services.

Another good example of marketing for connecting services is provided by the **Plusbus** system operating in the UK. Plusbus allows rail passengers to obtain a discounted day bus pass at the origin and destination points of their journey. This service could originally only be purchased at rail stations and was absent from most journey planners and ticket purchasing websites. Over the past two years, however, marketing of this system has been extended to a number of online media and information on availability is automatically provided for each rail journey. This (along with an expansion of the network and more effective marketing at stations) has led to a 70% increase in demand over the past

⁸⁰ <http://www.lufthansa.com/rowr/en/The-train-to-the-plane> (last opened 1/02/11)

year with 20% of all tickets now being purchased online directly through journey planners⁸¹. However, many towns and cities, as well as a number of routes of participating operators, are excluded from Plusbus - which is evidence of operators' attempt to protect certain revenues or market segments at the expense of ease of usage.

7.4 EN-ROUTE MARKETING OF CONNECTING SERVICES

7.4.1 Description

Improved marketing and information provision relating to local connecting services at interchange locations. This may involve devising more effective branding strategies (for example, by renaming services according to mode and destination or by reducing the number of different brands allowed) so as to avoid confusion and to make it easier for unfamiliar passengers to obtain information on the most relevant connecting services available to reach their destination. Another type of action that falls under this measure is more proactive marketing at the origin point or on-board the main leg of a given journey for connecting services available at the destination end.

7.4.2 Problems Addressed

Even though inter-modal pre-trip information is important, it can do little to reduce the burden imposed on passengers by the need to interchange between services or modes at potentially unknown locations⁸². The impact of incorrect or unclear information, combined with the high degree of uncertainty involved, contribute to a significant increase in the cognitive and affective effort expended by passengers. Yet, the fact that it is at stations that multiple transport providers come together makes the provision of effective and adequate information a major challenge. This is where the regulatory fragmentation of the transport system is most likely to be felt as passengers are exposed to a number of different, and potentially competing, operators. Each operator will often have its own marketing and information conventions culminating in the perception of a chaotic environment for the user.

Also many passengers do not seek information on local connecting services prior to making the journey and may instead rely entirely on wayside information to make their choices. Unless relevant information is marketed effectively, passengers may remain unaware of the alternatives available and make suboptimal choices as a result.

7.4.3 Applicability

At the wayside stage the key challenge for infrastructure managers and the operators of connecting services consists of both informing the passenger about the existence of a given service along with the need to provide a consistent, integrated and effective message. Although the operator of each alternative connecting service will often do its best to market their services, this can easily lead to information overload and confusion. It can also make it difficult for passengers to quickly identify the most suitable and cost-effective alternative to meet their needs. This type of measure may therefore require some form of regulation by interchange managers. For connecting services to be marketed before or during the main leg portion of the journey the development of partnerships between operators are required.

However, operators and infrastructure managers will, quite naturally, give more priority to publicising their own services or those of their clients than local connecting services for which they will receive no revenue. Local operators, on the other hand, may be reluctant to compromise their own brand image by allowing it to be diluted by association with a joint venture with another provider or group of providers. In fact, in many cases, operators may have worked very hard to establish an instantly recognisable brand and may see their greatest asset in attracting demand. As a result passengers are exposed to inconsistent or incomplete information and marketing messages as each operator

⁸¹ J Radley, personal communication

⁸² Lyons, G. and Harman, R. (2002), "The UK public transport industry and provision of multi-modal traveller information", *International Journal of Transport Management*, Volume 1, Issue 1, Pages 1-13.

strives to differentiate its service and promote a distinctive brand. Since infrastructure managers and main long distance operators (whom, it could be argued, have greater influence over the self-regulation of the market) do not often see greater interconnectivity as a key objective they may not be forthcoming in ensuring improved pre-trip marketing of connecting services.

Examples of potential confusion are provided by Heathrow Airport where passengers are bombarded by different brands sending out conflicting messages. **RailAir**, for example, is a bus service connecting to a rail station (rather than a high speed rail service such as the Lufthansa AIRail service), **Heathrow Express** is a fast rail connection to London, whereas **Heathrow Connect** is a stopping rail service, and **the Airline** is a coach service operating exclusively between Oxford and Heathrow. So a passenger arriving from Frankfurt might quite sensibly follow signs for RailAir, expecting to find a high speed rail service. While each of these services will probably benefit from very high brand recognition at their point of origin (e.g. there is only one "Airline" service in Oxford, and Heathrow is the nearest airport) they are likely to be extremely confusing to international inbound passengers.

A related problem for international travel in particular is the fact that connecting services are usually provided and marketed by local companies. This can lead to highly ineffective marketing for international passengers as in the case of Oslo Airport's **Flytoget** service, which, most foreign passengers will be unaware of, translates into "the Plane Train".

7.4.4 Performance

Costs Set up and variable costs for individual services or interchanges are likely to be low (<€1m). The greatest costs are likely to occur where this type of measure is part of the complete re-design of the information strategy at a given interchange or where connecting services are marketed at the origin point of journeys through staffed information points (as in the case of Terravision, for example).

Technical feasibility No significant hurdles.

Financial feasibility May generate profit through increases in demand. This is easier to gauge for staffed information points but a significant challenge for branding and marketing at interchanges. The effect is likely to be small given the number of passengers potentially affected (i.e. those who are unaware of connecting services through some other source of information and who would change their behaviour as a result). A conservative estimate of the potential long term increase in demand might be in the range 1% to 4%.

Organisational feasibility Main operators and interchange managers may consider this measure a waste of effort as it is aimed at persuading their own passengers to use the services of a different operator. However, this measure can actually contribute to increase main operator demand by widening catchment areas and attracting new demand segments so it's likely that this initial opposition can be easily overcome. This measure also relies on effective partnerships being developed between operators which can sometimes be a challenging task. These arguments are also valid for interchange managers.

Acceptance by users This measure aims to give passengers improved intermodal information close to the point of use so it is likely to be popular amongst users.

Impact on users' door to door travel time This type of measure may have a considerable impact on some passengers' travel time by informing them of an alternative connecting mode they may have been unaware of.

Impact on users' door to door travel cost This type of measure may have a significant impact on some passengers' travel cost by informing them of an alternative cheaper service they may have been unaware of. For example, an existing connecting public transport service may prove considerably cheaper and, often, just as quick as a taxi service.

Comfort and convenience There is likely to be some reduction in the level of uncertainty and anxiety experienced by passengers thereby making the travel experience more enjoyable. By

eliminating the need to obtain and combine information from a range of different sources this measure is also likely to make intermodal journey planning more convenient.

Users' safety No impact is envisaged.

Personal security No impact is envisaged.

Access for people with reduced mobility Any measure that reduces the cognitive and affective effort required for information acquisition is likely to have a positive impact on travellers with disabilities.

7.4.5 Other Impacts

Small positive environmental impact may be expected if passengers are encouraged to switch from car or taxi to public transport.

7.4.6 Examples

An excellent example of the provision of information about connecting services at the origin point or on board main services is the **Terravision coach service** linking a number of European airports to nearby destinations. As a result of partnerships between Terravision and several airlines, the company markets its services at check-in gates, on-board flights and is also available through some online flight booking systems. Although there is a risk that this approach may lead the passenger to make sub-optimal choices it certainly reduces the information acquisition burden for unfamiliar users very considerably.

Lufthansa's **AIRail** service highlights the important role of station/airport managers or leading operator in streamlining information and adapting it to the needs of long distance passengers.

7.5 PRE-JOURNEY INFORMATION ABOUT INTERCHANGES

7.5.1 Description

Provision of advance information to travellers about the layout of the interchange point (airport, port or major rail station). Provision might be via documentation sent out with tickets, on the website of the interchange points or transport operators, or on public transport services heading towards the interchange point.

7.5.2 Problems Addressed

Orientation especially at larger interchange points might be difficult for passengers not familiar with the airport / station / port.

7.5.3 Applicability

All interchange points, but most particularly large or complex ones.

7.5.4 Performance

Cost Costs to offer this kind of information are minimal – though provision does have to be made to ensure that the information is kept up to date.

Technical feasibility No problems.

Financial feasibility No problems.

Organisational feasibility No particular problems are foreseen – except perhaps in ensuring that the information is kept up to date.

Acceptance by users Passengers welcome advance information about the interchange point.

Other aspects of political acceptability No problems foreseen.

Impact on users' door to door travel time A slight reduction for travellers who are not familiar with the interchange point may apply.

Impact on users' door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience Easy orientation at an interchange point avoids detours and makes intermodal travelling more convenient.

Users' safety No particular impact is expected.

Personal security No particular impact is expected.

Access for people with reduced mobility Advance information especially concerning the services available at an interchange point is helpful for disabled travellers.

7.5.5 Other Impacts

None identified, except that, if the change attracts users who formerly used to travel by car or taxi, there could be resulting reductions in congestion and GHG emissions.

7.5.6 Examples

Website of Frankfurt Airport⁸³. Timetable CD of Deutsche Bahn.

7.6 'ONE STOP SHOP' MULTI-MODAL JOURNEY PLANNER - NATIONAL

7.6.1 Description

Development of single national portals providing door to door multi-modal travel information.

7.6.2 Problems Addressed

Many countries still lack complete and consistent door to door multi-modal travel information services allowing the comparison of alternative modes and covering connecting local services as well. Passengers are often faced with the need to use multiple sources to obtain intermodal travel information whereas a single source combining all information would be more convenient and provide more complete information. Even in countries where such systems already exist, they often have important gaps such as information on multi-modal costs.

7.6.3 Applicability

The pre-trip stage is critical both for obtaining information necessary to mode/route choice and to reduce the physical and emotional effort required during the trip. Kenyon and Lyons (2003)⁸⁴ argue that lack of prior information creates a challenging task for the public, which involves: identifying a suitable information source, determining the modal alternatives which are covered by this source, and finally, finding the relevant information. It can be argued that these steps may need to be repeated if different sources containing different types of information exist. This relatively complicated process clearly puts intermodal travel at a disadvantage with car travel which can rely mostly on information collected along the way (e.g. through road signs, radio broadcasts, GPS navigation devices).

⁸³ www.frankfurt-airport.com/ (last opened 1/02/11)

⁸⁴ Kenyon, S. and Lyons, G. (2003), "The value of integrated multimodal traveller information and its **potential contribution to modal change**", *Transportation Research Part F: Traffic Psychology and Behaviour*, Volume 6, Issue 1, Pages 1-21.

The process is considerably complicated by the fact that many sources of information deal only with a subset of the modes and services required to complete the journey. For example, many travel agents will have no knowledge of local bus services linking an airport to the local city and are unlikely to be able to sell tickets for such services in conjunction with an air ticket. Similarly, most internet-based journey planners deal only with a single mode. This may be because they cannot earn any commission from sale of the "local" tickets, or because of institutional and technical barriers involved in accessing such information.

Recent UK research shows very little awareness and usage of multi-modal travel planning services, suggesting that passengers typically seek out information based on the main mode they expect to travel with. Although there would be apparent advantages for single mode sources to incorporate multi-modal information there seem to be strong institutional barriers to overcome. Whereas the most popular rail information service in the UK is run by the Association of Train Operating Companies, the multi-modal services are led by the Department for Transport (Transport Direct)⁸⁵ and the association of local public transport operators (Traveline)⁸⁶. The current situation seems to indicate that different stakeholders perceive information media as valuable (and a powerful marketing tool) and see alternative sources of information as a threat.

One may argue that the complex and fragmented operating environment in the UK has eventually led to the provision of high quality pre-trip information with a significant voluntary contribution from private sector stakeholders. However, a number of unnecessary barriers remain for passengers to overcome (e.g. the confusion arising from the multiplicity of incomplete information sources). So while information sources do exist their marketing to passengers is relatively poor.

7.6.4 Performance

Cost Costs are likely to increase with the number of different operators involved due to the effort required in obtaining additional information. However, this kind of information is also useful for management purposes, so the marginal cost is likely to be absorbed by operators. The initial set up costs should be relatively low (<€1m).

Technical feasibility The need to build (and maintain) a common central database from a very large number of individual datasets presents some technical challenges. Different conventions are used by different operators for storing alphanumeric data (such as routes, timetables and fares). Also the increasing use of yield management techniques makes it difficult to have a continuously up to date source of information. The wide range of tickets available in some contexts (e.g. where a range of discounts are available for different types of users) and the fact that constraints on each ticket vary from operator to operator are further obstacles to the development of consistent databases. However, past experience (e.g. Switzerland, UK, Germany) suggests that once a common database format has been specified feeding of information is more of an organisational than technical problem.

Financial feasibility May generate profit through increases in demand. However, it is a significant challenge to put a number to the valuation of such soft factors. Information is available on the usage of existing journey planners, but it is difficult to establish a correlation between that and actual trips made. A conservative estimate of the long term increase in demand would be in the range of 1% to 5%.

Organisational feasibility The success of such a system depends crucially on the number of operators included. However, it may prove testing to persuade a potentially very large number of operators that taking part in such a project is in their interest when intermodal passengers represent a relatively small share of their market. Operators are also likely to be reluctant to sharing their information with other organisations whereas, in some cases, databases may not exist at all or be incomplete. As demonstrated by the UK and Swiss examples, national authorities or large public sector operators have a key role to play here in regulating or persuading operators to join the system.

⁸⁵ www.transportdirect.info/Web2/JourneyPlanning/ (last opened 1/02/11)

⁸⁶ www.traveline.info/ (last opened 1/02/11)

Acceptance by Users This measure aims to simplify intermodal journey planning and is therefore likely to prove very popular with users.

Other aspects of political acceptance There could be some political opposition where this type of measure is perceived as unnecessary government intervention in an otherwise sound market. However, previous experience suggests this is unlikely to be the case.

Impact on users' door to door travel time This type of measure may have a considerable impact on some passengers' travel time by informing them of an alternative route they may have been unaware of.

Impact on users' door to door travel cost This type of measure may have a considerable impact on some passengers' travel cost by informing them of an alternative cheaper route they may have been unaware of. For example, an existing connecting public transport service may prove considerably cheaper and, often, just as quick as the taxi service which many first-time travellers tend to opt for.

Comfort and convenience There is likely to be a reduction in the level of uncertainty and anxiety experienced by passengers thereby making the travel experience more enjoyable. By eliminating the need to obtain and combine information from a range of different sources this measure is also likely to make intermodal journey planning more convenient.

Users' Safety No impact is envisaged.

Personal security No impact is envisaged.

Access for people with reduced mobility Any measure that reduces the cognitive and affective effort required for information acquisition is likely to have a positive impact on travellers with disabilities.

7.6.5 Other Impacts

A small positive environmental impact may be expected if passengers are encouraged to switch from car or taxi to public transport.

7.6.6 Examples

In **Switzerland** both the national rail operator (**SBB**), local **Verkehrsverbunde** (transport authorities) and even **airport websites** offer the same very simple **journey planner** providing fully integrated information on door to door travel, including ticketing and international travel by rail. SBB also offers a parallel internet travel agent service, which allows accommodation and travel by alternative modes (including car rental) to be booked in an integrated way. This '**one stop shop**' approach reflects the Swiss focus on integrated transport, which is suggested as one of the critical factors for its sustained growth in public transport patronage. One important success factor in Switzerland seems to be the dominant and powerful position of the national rail operator allied to the fact that rail is the dominant mode for intercity travel. Another important group of stakeholders are the local Verkehrsverbunde, who answer to the cantonal (state/regional) governments and municipalities and with responsibilities for strategic marketing, transport planning and financing. The lack of direct competition between different agencies/operators, the policy emphasis on coordination and the relatively simple market structure (with respect to the UK) mean that the objectives of different stakeholders are well aligned. The focus is therefore on passenger needs rather than the threat posed by potential competitors.

This case study leads us to conclude that when services are run by a single operator (in this case, all rail services are run by SBB), one will expect that operator to recognise the importance of providing publicity and information about opportunities for interconnection between them. And when services are licensed or franchised by a single body (e.g. Verkehrsverbunde), and particularly if that body provides a subsidy, one might expect that body to take steps to ensure that potential interconnections are well publicised - not least because provision of such information should maximise the usefulness of the services to the local population and help ensure that the best value is achieved for any subsidy.

However, this will not happen if the body has insufficient influence or is, itself, not focussed on the wider picture. The Swiss context combines a strong national operator with powerful local transport operators whose objectives are aligned and focused on the improvement of the passenger experience and the growth of public transport demand.

The UK's success in setting up a common data format that accompanied the development of the government sponsored multi-modal **Transport Direct journey planner**⁸⁷ makes another interesting case study⁸⁸. The full story of how this system developed is beyond the scope of this report so, instead, we try to draw out the key success features. The development of a common format for the recording of local public transport networks (ATCO-CIF) was initiated by Traveline⁸⁹, a partnership between bus operators and local authorities. Individual operators provide raw data and local authorities are responsible for compiling full data sets. The rail infrastructure manager compiles a central database of services from the agreed timetable and eventually followed the lead of Traveline and now publishes data in a format similar to ATCO-CIF. When the UK government decided to promote a 'national' multi-modal journey planner it largely drew on the Traveline and rail data sets in ATCO-CIF format, although it later introduced an improved data format (TransXchange). The key government contribution, however, was perhaps to emphasise the importance of travel information and to encourage operators to improve the quality of data. It could also be argued that, by stepping into the information market, it averted any potential conflict between operators owning different sources of information.

In spite of the quantity and quality of multi-modal data now publicly available in the UK as a result of this process a number of challenges remain. The obvious problem is that the level of spatial detail with which routes are recorded varies between operators and local authorities as does the frequency of updates. Fare information also remains absent.

In some other parts of Europe, with simpler operating environments and greater public sector involvement such as **Sweden, Germany and Switzerland**, the development of common data formats has followed a much quicker and easier route. However, these factors are not a sufficient condition for the provision of high quality multi-modal information as is demonstrated by the **French** example where the best available system is PASSIM (Portail annuaire des sites et des services sur la mobilité)⁹⁰, which is a simple spatial repository of different services operating in each area.

7.7 'ONE STOP SHOP' MULTI-MODAL JOURNEY PLANNER - INTERNATIONAL

7.7.1 Description

Development of single international portal providing door to door multi-modal travel information including ticketing.

7.7.2 Problems Addressed

Although there are several ways of obtaining pre-trip information separately for local connecting services and the main leg portion of international trips, there is a clear lack of integrated systems combining these different sources of information to provide comprehensive door to door travel information for international trips. Passengers are therefore faced with the need to use multiple sources to obtain intermodal travel information, some of which are likely to be available only in a language they are unfamiliar with.

⁸⁷ www.transportdirect.info/Web2/JourneyPlanning/ (last opened 1/02/11)

⁸⁸ <http://timhowgego.com/introduction-to-uk-local-public-transport-data.html#transxchange> (last opened 1/02/11)

⁸⁹ www.traveline.info/ (last opened 1/02/11)

⁹⁰ <http://www.passim.info/> (last opened 1/02/11)

7.7.3 Applicability

As noted above, travellers would benefit from easier access to journey planning information. The potential benefits to users are particularly great in the context of international travel, but the costs of providing an international service, and the technical obstacles to be overcome, are also greater.

Although in principle this solution is applicable everywhere. It is likely to be a practical proposition only where countries' existing systems have compatible technical specifications (see below) and/or where there is a considerable volume of traffic between the countries.

7.7.4 Performance

Cost Costs are likely to increase with the number of different operators involved as the central system needs to be able to cope with different databases and software architectures. The initial direct set up costs should be relatively low (<€1m); however, since the IATA codes are not sufficient to cover all train stations, any necessary change to the coding system could become extremely expensive.

Technical feasibility The need to either build a common central database from a very large number of individual datasets or to devise a piece of software which is able to dialog with a variety of local systems presents a considerable technical challenge. The problems discussed in the context of solution 7.6 are further complicated by: language differences; differences in the accepted definition of modes (e.g. in the distinction between tram, metro, S-bahn, light rail, U-bahn and underground); the use of different geographical frames (e.g. postcodes, grid-references, city areas); and the use of a wider range of conventions for storing alphanumeric data. Solutions to some of these challenges have been explored in various European research projects and pilot schemes.

Financial feasibility May generate profit through increases in demand. However, it is a significant challenge to put a number to the valuation of such soft factors. A conservative estimate of the potential long term increase in demand would be in the range 1% to 5%.

Organisational feasibility The success of such a system depends crucially on the number of operators included. However, it may prove testing to persuade a potentially very large number of operators that taking part in such a project is in their interest when intermodal passengers represent a relatively small share of their market. Operators are also likely to be reluctant to sharing their information with other organisations whereas, in some cases, databases may not exist at all or be incomplete. But even where public sector agencies lead the development and provision of integrated travel information data, availability is usually limited to national operators and agencies, which may be reluctant to exchange data with foreign counterparts. Indeed, the development of international databases remains the key challenge for long distance multi-modal travel in Europe. Although this is partly a technical issue the main challenges seem to be the need to increase the degree of trust between international partners and the need to promote information sharing.

Acceptance by users This measure aims to considerably simplify intermodal journeys planning and is therefore likely to prove very popular with users.

Other aspects of political feasibility There may be political opposition where well known national/local journey planners could be under threat. Political authorities could potentially attempt to protect local journey planners thereby undermining the success of this measure.

Impact on users' door to door travel time This type of measure may have a considerable impact on some passenger's travel time by informing them of an alternative route they may have been unaware of.

Impact on users' door to door travel cost This type of measure may have a considerable impact on some travellers' travel cost by informing them of an alternative cheaper route they may have been unaware of. For example, an existing connecting public transport service may prove considerably cheaper and, often, just as quick as the taxi service which many international travellers tend to fall back on.

Comfort and convenience There is likely to be a reduction in the level of uncertainty and anxiety experienced by passengers thereby making the travel experience more enjoyable. By eliminating the need to obtain and combine information from a range of different sources this measure is also likely to make intermodal journey planning more convenient.

Users' Safety No impact is envisaged.

Personal security No impact is envisaged.

Access for people with reduced mobility Any measure that reduces the cognitive and affective effort required for information acquisition is likely to have a positive impact on travellers with disabilities.

7.7.5 Other Impacts

Small positive environmental impact may be expected if passengers are encouraged to switch from car or taxi to public transport.

7.7.6 Examples

With respect to the exchange of spatial data, the recent development of the **Google Transit** system has created what is perceived to be a neutral platform for the provision of local public transport information. A common format is specified, which is easy enough for most operators to comply with.

"The GTFS [General Transit Feed Specification] defines a common format for public transportation schedules and associated geographic information."⁹¹ Although membership of this platform is completely voluntary, the global marketing appeal of the Google brand has led to strong growth in the number of systems covered (over 445 cities from around the world)⁹². The system is, at the moment, only available to local public transport operators but the data format used is sufficiently general that it could be easily extended to intercity air and surface operators.

The **UiTP** is currently trying to tackle the challenges surrounding data sharing through its **Interoperable Fare Management project** (IFM). While the project is chiefly concerned with the development of interoperable fare management systems, the solutions being developed are entirely transferable to the sharing of information.

Everybody Local Everywhere. From a public transport customer's point of view, it would be nice to have only one smartcard in your wallet which enables travel everywhere in a familiar way. [...] Almost equally important is that you are informed about your travel options; that you know how to purchase the right ticket; and that you pay the correct amount. Again, it would be nice if you could do this as you are used to do it in your own city or country. Therefore the idea is that everybody can travel everywhere as if it were a local journey. All these aspects of travel should be seamless: Information - before, during and after the trip; Travel - physical connections and transfers offered by different operators; Fares - one (virtual) ticket for all of the journey; and Payment - your money should end up with the different parties who provided the services you enjoyed."⁹³ Much of this project has concentrated on the development of a '**Trust Model**', which has been identified by operators as a critical component for a truly integrated international system. A Trust Model essentially sets out how information is exchanged between partners and how it is managed at every stage.

Whereas the IFM project has sets its aims high by focusing on common fare systems there have been a string of European projects and pilots over the past few years with the more modest objective to develop international multi-modal journey planners. **EU Spirit** has perhaps been the project with the

⁹¹ http://code.google.com/transit/spec/transit_feed_specification.html (last opened 1/02/11)

⁹² <http://www.google.com/intl/en/landing/transit/#mdy> (last opened 1/02/11)

⁹³ UiTP (2010), Integrated Fare Management (IFM) project website:
<http://www.uitp.org/knowledge/projects-details.cfm?id=443> (last opened 1/02/11)

most tangible results allowing the planning of multi-modal door-to-door journeys between a sample of cities in Germany, Luxembourg, Denmark and Sweden⁹⁴.

EU Spirit does not contain a central information database and has instead **developed an interface that links in with journey planners maintained by individual operators** (see also the distributed concept described in TCRP 83)⁹⁵. The key attractions of this “distributed approach” are that a single database format and central database need not be created, making it apparently easier to incorporate additional operators and bypassing the need for mutual access to each operator’s database. The passenger can also use its local journey planner (with which he/she is more likely to be familiar) to plan the entire journey. The problem, however, is that the technical difficulty in developing such a system and the amount of effort required to incorporate a new non-standard operator is not trivial. While this project has shown international journey planners to be a technically feasible proposition its limited spatial coverage reflects the high marginal cost of expanding the system to new operators. Project **WISETRIP**⁹⁶ (started in 2008) follows a similar approach to EU Spirit. A test journey planner has been made available in March 2010 but is not yet fully operational.

7.8 LOCAL TRANSPORT TICKET SALES VIA INTERNET

7.8.1 Description

Selling local transport tickets via the Internet.

7.8.2 Problems Addressed

To reduce the inconvenience of local transport ticket purchase (especially useful for non-citizens).

7.8.3 Applicability

Everywhere.

7.8.4 Performance

Cost Costs of the electronic platform set up and operation.

Technical feasibility No insurmountable problems (if tickets are printed by the purchasers there needs to be a system for detecting forgeries).

Financial feasibility Mainly costs of the implementing the selling platform (costs of operation are fairly low).

Organisational feasibility Organisational and legal question of security of the transactions.

Acceptance by users No problems.

Other aspects of political acceptability No particular problems.

Impact on users’ door to door travel time Reducing travel time due to reduced need to purchase tickets during the journey and reduced boarding times because other travellers already have tickets.

Impact on users’ door to door travel cost No particular impact is expected

Initial impact on comfort or convenience Facilitates trip, especially for non-citizens or people from abroad.

⁹⁴ <http://www.eu-spirit.com/> (last opened 1/02/11)

⁹⁵ TCRP (2002), *Strategies for Improving Public Transportation Access to Large Airports*, TCRP Report 83, Transportation Research Board, Washington D.C.

⁹⁶ www.wisetrip-eu.org/ (last opened 1/02/11)

Users' safety No particular impact is expected.

Personal security No significant impact – although some users might perceive a transactions security risk.

Access for people with reduced mobility No particular impact, but perhaps fewer problems involved with ticket purchase.

7.8.5 Other Impacts

If the change attracts users who formerly used to travel by car or taxi, there could be resulting reductions in congestion and GHG emissions.

The technology could provide more accurate passenger-trip information which can be used for patronage monitoring, marketing and network planning.

7.8.6 Examples

There are many examples of local transport tickets being sold via the internet⁹⁷ and some include rail /air options⁹⁸.

7.9 PRICING INFORMATION & PAYMENT SYSTEMS FOR INTERNATIONAL TRAVELLERS

7.9.1 Description

This would see pricing systems for public transport services clearly marked at vending machines, ticket desks and information hubs within international interchanges in key foreign languages with explanations as to the structure and availability of tickets (e.g. how long tickets last for and how far you can travel on them).

7.9.2 Problems Addressed

This will improve the information for international passengers and gives them confidence in what ticket types are available, across a variety of modes.

7.9.3 Applicability

This would be applicable to all international interchanges such as airports, ports and international railway stations.

7.9.4 Performance

Cost Costs considered include the re-design and production of marketing and information materials

Technical feasibility No significant hurdles.

Financial feasibility No direct revenue streams will result from these changes.

Organisational feasibility No major issues.

Acceptance by users The main purpose of this measure is to remove unnecessary complexity in order to make journeys simpler for users so this is likely to be a popular measure.

Other aspects of political feasibility No problems are foreseen.

⁹⁷ http://www.vrr.de/de/tickets_und_tarife/ticketshop/index.html (last opened 1/02/11)

⁹⁸ e.g. <http://www.bahn.de/i/view/GBR/en/prices/germany/citymobil.shtml> (last opened 1/02/11)

Impact on users' door to door travel time No major impact is envisaged. Some slight time savings due to lower transaction costs being incurred (i.e. information search costs are reduced).

Impact on users' door to door travel cost No significant effect is envisaged.

Comfort and convenience This will improve the convenience for international travellers making onward feeder journeys to their destinations.

Users' Safety No impact is envisaged.

Personal security No impact is envisaged.

Access for people with reduced mobility Any measure that reduces the cognitive and affective effort required for information acquisition is likely to have a positive impact on travellers with reduced mobility.

7.9.5 Other Impacts

Small positive environmental impact may be expected if passengers are encouraged to switch from car or taxi to public transport.

7.9.6 Examples

In Japan the public transport authorities are making a conscious effort to provide travel information in foreign languages⁹⁹. It was difficult to find examples of where travellers could use foreign currency to purchase travel tickets, however it should be noted that in airports it is now common practise for shops to allow customers to pay in a number of major foreign currencies.

7.10 SMART PHONE APPLICATIONS

7.10.1 Description

The use of SmartPhone applications and GPS to provide the traveller with location specific and contextual information in real time that would enable them to: (1) Make convenient and rational choices about their connecting transport legs; and (2) Purchasing or changing tickets/bookings/reservations (6.11).

7.10.2 Problems Addressed

To reduce the inconvenience and effort required to find out travel information either before travelling, when delayed or when in a new environment. This aides the traveller in evaluating all the travel options open to them at any given time, allowing them to not only choose their best option but to purchase travel at the same time or change hotel reservations that will enable them to choose the travel option they wish to take.

7.10.3 Applicability

Everywhere.

7.10.4 Performance

Cost Costs of the electronic platform set up and operation by transport providers.

Technical feasibility No insurmountable problems.

⁹⁹ <http://www.into.go.jp/eng/arrange/transportation/purpose.html> (last opened 1/02/2011)

Financial feasibility Transport providers are moving towards internet based platforms that can be accessed by Smart Phones and allow the user to interact in terms of finding out real time information and purchasing tickets or alter reservations etc.

Organisational feasibility No significant impacts expected.

Acceptance by users No significant impacts expected.

Other aspects of political acceptability No particular problems.

Impact on users' door to door travel time Likely to reduce travel times for users who will be better informed passengers, able to choose from a broader range of travel options and so minimise their journey time. The same users will also benefit from reduced waiting time at ticket offices or at the point of entry. Fellow passengers will also benefit from reduced boarding times associated with Smart Phone users.

Impact on users' door to door travel cost No particular impact is expected.

Initial impact on comfort or convenience Facilitates a greater level of convenience for the users.

Users' safety No particular impact is expected.

Personal security No significant impact.

Access for people with reduced mobility No particular impact, but the possibility that users would be better informed about the accessibility of the transport options open to them.

7.10.5 Other Impacts

If the change attracts users who formerly used to travel by car or taxi, there could be resulting reductions in congestion and GHG emissions.

The technology could provide more accurate passenger-trip information which can be used for patronage monitoring, marketing and network planning.

7.10.6 Examples

Examples of local transport tickets have been outlined in section 7.8. Real-time journey planning applications are also available as outlined in section 7.6 and 7.7.

8 ENABLING SOLUTIONS

8.0 INTRODUCTION

The interventions discussed in this section do not provide a complete solution to problems affecting end users; rather, they seek to facilitate the implementation of solutions by reforming aspects of the operating environment. Their performance is summarised in Table 1.7 and a more detailed description of each solution is presented below.

Stakeholders thought that Solutions 8.1 and 8.11 had particularly high potential to improve interconnectivity and that Solutions 8.1 and 8.12 were likely to yield the highest benefit/cost ratios.

The impacts of these solutions on the traveller's experience would come about indirectly – because some other development is facilitated.

8.1 INTRODUCTION OF A SINGLE STRATEGIC AUTHORITY

8.1.1 Description

Bringing together the various governmental decision-making bodies into a single strategic authority, such as in London, Paris and several German regions (e.g. Frankfurt).

8.1.2 Problems Addressed

Fragmented decision-making at the strategic level, leading to failures to develop and enact truly comprehensive and cohesive strategy which serves the needs of all passengers – including those whose long distance journeys have a local leg.

8.1.3 Applicability

Wherever two or more government actors (agencies, departments or local authorities) have responsibilities relating to passenger transport (i.e. in most places). Generally most suited to medium to large cities and/or regions where the costs of establishing such a formalised authority are more likely to be outweighed by the benefits.

8.1.4 Performance

Cost Principal costs will be associated with staff and offices, but the number and seniority of staff is likely to push the costs in excess of €1 million. It has to be assumed that the establishment of a new administration does not substitute entirely the existing ones. As such either the number of employees will exceed the sum of employees of the regional offices or some departments will coexist at regional level as well as at national level.

Technical feasibility There is no evidence to suggest technical feasibility will pose a problem.

Financial feasibility The relatively significant running costs are likely to be met with some resistance, e.g. if the constituent authorities are all being asked to contribute to the funding of the new authority.

Organisational feasibility The upheaval associated with establishing a new authority and the transfer of powers from existing constituent authorities to the new authority are likely to be sources of difficulty.

Acceptance by users There is no evidence to suggest that user acceptance will be directly affected.

Other aspects of political acceptability Echoing a point from above, the transfer of powers from existing constituent authorities to a new authority is likely to be politically charged.

8.1.5 Likely Impacts

Should bring about numerous changes which are useful to long distance travellers and the establishment of a new regional authority would, most likely, raise the profile of the region itself. It might also be expected that a single strategic authority might be more likely to prioritise the needs of disadvantaged (low income or mobility-impaired) travellers.

8.1.6 Examples

Transport for London (TfL)¹⁰⁰ brings together the transport function for all 32 London Boroughs, and Integrated Transport Authorities exist to coordinate public transport in six English regions. Other examples include the public transit authority of the Rhone and Lyon and Barcelona's Transports Metropolitans de Barcelona.

Formalised coordination agreements, be they in the form of a Transport Consortium (e.g. Spain) or in the form of agreements between several operators (e.g. Belgium).

Legal entities bringing together a range of interested parties into a single, decision-making unit, such as the 'Single Purpose Vehicle'.

Legislative commitments to intermodality, such as in France (SRU Act, Urban Regeneration and Solidarity, 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 Dec. 2000).

Transport consortium – e.g. in Madrid there is an objective to provide administrative, fare and modal integration. They establish a legal framework to force intermodal co-operation, and force co-operation between subsidised and commercial operators.

Non-legal commitment to promote intermodality (such as in Austria).

8.2 VOLUNTARY PARTNERSHIPS

8.2.1 Description

Voluntary arrangements amongst authorities and other stakeholders, to come together in an effort to promote a strategy and to combine resources. Rather than it occurring as a result of a top-down direction, such partnerships often emerge from bottom-up initiative, spurred by one or more organisations identifying an opportunity for achieving a better outcome by working together with like-minded organisations.

8.2.2 Problems Addressed

Fragmented decision-making at the strategic or operations level, leading to failures to develop and enact truly comprehensive and cohesive strategy which would assist long distance travellers whose journey includes a local leg.

8.2.3 Applicability

Wherever two or more stakeholder organisations with responsibilities relating to passenger transport are not already compelled to work in partnership (i.e. most places). Clearly relevant to the provision of local transport services for long distance travellers.

8.2.4 Performance

Cost Costs would, necessarily, be relatively low, as it is unlikely that organisations would enter into such voluntary arrangements with one another if the cost to them of doing so was significant.

¹⁰⁰ <http://www.tfl.gov.uk/tfl> (last opened 01/02/11)

Technical feasibility There is no evidence of any problems.

Financial feasibility There is no evidence that this will pose a significant problem as costs can be low and government funding for the initiation of such partnerships is sometimes made available.

Organisational feasibility This may pose some difficulties, as the establishment of a partnership will involve some organisational effort, but given that it is envisaged that partnerships will be amongst 'like-minded' organisations, it is unlikely that such difficulties will be prolonged. Potentially more problematic will be concerns that co-operation will breach anti-competitive law or that it may inadvertently help a competitor. The latter point also raises the possibility that there may not be any actual willingness to engage in an agreement with an organisation that you are competing against or to come under the influence of a local government agency.

Acceptance by users There is no reason to expect user acceptance to be an issue.

Other aspects of political acceptability Voluntary arrangements can be politically popular provided they are not seen as anti-competitive.

8.2.5 Likely Impacts

Improved conditions can be expected to emerge for travellers who make use of services offered by more than one operator.

8.2.6 Examples

Many examples of partnerships to enhance provision of public transport exist in Europe. For example, in Finland, government fosters voluntary co-operation (e.g. by co-funding projects to promote co-operation on ticketing systems), and in the UK, several Rural Transport Partnerships exist, with the aim of improving access to public transport in rural areas. But these partnerships are not specifically related to the provision of local connections for long distance journeys. More relevant therefore, are partnerships between airports and public transport operators, airports and local taxi firms. In the UK FirstGroup was involved in a partnership with BAA Heathrow during 2003 and 2004 which saw the two introduced a fleet of ten low-emission buses on two routes linking Slough with the airport as part of BAA's Clean Vehicles Programme¹⁰¹,

Airline Alliances and partnerships between railroad companies (e.g. SBB with DB/ SNCF) make booking and travelling easier for passengers whose long distance journeys require them to use the services of more than one operator.

In practice these partnerships often involve some contractual agreement (see Solution 8.3).

8.3 INTERMODAL AGREEMENTS

8.3.1 Description

Contractual agreements under existing law which cover any number of strategic and/or operational aspects, including joint marketing through to coordination of services. Hence, they involve organisational change but not legal change.

8.3.2 Problems Addressed

Fragmented decision-making at the operational level, leading to failures to coordinate operations and services to the full benefit of the passengers – including long distance travellers whose journey includes a local leg.

¹⁰¹ http://www.firstgroup.com/ukbus/berkshire_thames/about_us/

8.3.3 Applicability

Wherever two or more operators (of any mode) provide services for which existing law permits some level of cooperation (i.e. in most places). Clearly relevant to the provision of local transport services for long distance travellers.

8.3.4 Performance

Cost Voluntary intermodal agreements will only take place if the costs to those involved are relatively low. Costs will include management time costs increases in operations costs and any revenues foregone (if shared with the other operator(s) in the agreement).

Technical feasibility There is no evidence that technical feasibility will pose problems.

Financial feasibility The relatively low costs envisaged would generally mean that financial feasibility should not be a problem; occasionally there may be initial difficulties regarding the financing of set-up costs, as organisations learn to work with one another.

Organisational feasibility Developing an agreement in principle, and making it work in practice, can take some considerable effort if operators would otherwise be in open competition with one another.

Acceptance by users User acceptance is likely to be positive.

Other aspects of political acceptability There may be some political concern from those who strongly favour competition as a means of ensuring downward pressure on costs and upward pressures on customer focus however this is much less likely to be the case with an inter-modal agreement where the focus of the agreement is likely to be on the provision of complementary services and not competitive services. Such agreements are likely to be welcomed by politicians, especially those favouring a more cooperative and collaborative approach.

8.3.5 Likely Impacts

Positive impacts can be expected to emerge for travellers whose journeys involve a change of mode.

8.3.6 Examples

Agreements between various airlines and train operators include: Air France and SNCF; Air France and Thalys; Lufthansa and Deutsche Bahn; Deutsche Bahn and numerous non-European airlines serving Frankfurt Airport; airlines and CHH (for example to permit check in for flights at Zurich rail station).

One case where the dominant airline stopped operating its flights after concluding an agreement with the train operator - Air France, on the Brussels-Roissy CDG route, 'entrusts' passengers to Thalys for access and egress to the airport.

8.4 RELAXATION OF ANTITRUST LAWS

8.4.1 Description

To legislate in order to lift some of the restrictions placed on what transport operators operating in a competitive market are permitted to do, particularly in relation to cooperation with other operators. This would include permitting cooperation amongst operators regarding joint ticketing and pricing and joint scheduling of services. It would also allow, for example, an airport to form an agreement with one particular local transport operator (e.g. giving them exclusive access to convenient pick-up and drop-down points) which might be detrimental to other local transport operators.

8.4.2 Problems Addressed

Fragmented decision-making at the operational level, leading to failures to coordinate operations and services to the full benefit of passengers and leading to the loss of network benefits. For long-distance travellers whose journeys includes a local leg these failures could result in poor co-ordination between the long-distance and short-distance services or to a confusing array of short distance services which leaves major gaps in the required provision (e.g. a plethora of peak hour services but no night-time services).

8.4.3 Applicability

Where there is a competitive market for transport services and, as a consequence, the law precludes collaboration and working together with what might otherwise would be a competitor operator for fear that those operators behaving like a cartel and exploit their market power.

8.4.4 Performance

Cost The costs of amending legislation are usually significant.

Technical feasibility There is no evidence that technical feasibility will pose a problem.

Financial feasibility Costs are likely to fall mainly on government, but if there are plans for transport legislation to which this could be added, feasibility will be greater.

Organisational feasibility Amending legislation is likely to take some considerable time and effort on the part of civil servants and politicians. Furthermore, we would expect that proposals to amend legislation would be the subject of considerable lobbying by various parties in an effort to influence the outcome.

Acceptance by users There is no evidence that user acceptance would be directly affected. Some users will be wary of the possible prospect of operators' behaving like a cartel, whilst others will welcome the prospect of operators being permitted to cooperate more closely.

Other aspects of political acceptability Given the ideological tensions between competition and cooperation that exist, this is likely to be politically contentious.

8.4.5 Likely Impacts

No specific impacts are identified but it is clearly possible that the indirect impacts could include a mix of positive and negative outcomes related to beneficial co-operation and adverse cartel like behaviour.

8.4.6 Examples

Since 2008, UK local authorities have been able to form agreements with individual local bus companies which allow them exclusive access to certain bus lanes and premium bus stop locations and/or offer exclusive rights to operate on certain routes, in exchange for agreements on quality and price.

Several airports and major rail stations have agreements with named bus companies and named taxi companies who are allowed exclusive access to the station forecourt or airport site despite the fact that these are, strictly speaking, anti-competitive agreements.

8.5 INCREASE COMPETITION WHERE LITTLE OR NONE EXISTS

8.5.1 Description

The relaxation of restrictions on the ability of operators to enter a market and compete with an incumbent operator. This would often be combined with the dissolution of a monopolistic or dominant incumbent operator into a number of smaller, independent operators in an effort to reduce the power

of the incumbent to resist the new market entry. The assumption here would be that any regulation of the market would be minimal or light-touch, focused on eliminating anti-competitive practices and, hence, allowing market forces to determine the shape of services provided.

8.5.2 Problems Addressed

Monopolistic practices by those transport operators who provide the local leg of long distance journeys (e.g. bus or rail links to/from an airport, taxi services to/from an airport or major station) which result in inflated fares, restricted levels of service or the suppression of service innovations. Existence of a strong monopoly on a national, or international, scale can also frustrate the development of national policy goals.

8.5.3 Applicability

Where there is a monopoly or other dominance in the market for the provision of local transport services and/or where there is competition but where regulation is thought to be constraining its effectiveness.

8.5.4 Performance

Cost The costs of amending legislation can be significant.

Technical feasibility There is no evidence that technical feasibility will pose a problem.

Financial feasibility Competitive provision of services is, almost by definition, commercially sustainable. However, the costs of introducing and maintaining competition are likely to fall mainly on government.

Organisational feasibility Amending legislation is likely to take some considerable time and effort on the part of civil servants and politicians. Furthermore, we would expect that proposals to amend legislation will be the subject of considerable lobbying by various parties in an effort to influence the outcome.

Acceptance by users Many existing users will be nervous about the potentially major changes that could result (e.g. withdrawal of uneconomic services – particularly off-peak; fragmentation of services, tariffs and information). Others may welcome the prospect of a more customer-focused and commercially sustainable service (perhaps leading to increased frequencies during the peak).

Other aspects of political acceptability Given the ideological tensions between competition and cooperation that exist, this is likely to be politically contentious.

8.5.5 Likely Impacts

Fragmented decision-making at the strategic and/or operations level might lead to failures to develop and enact comprehensive and cohesive strategy and/or operations and, as a result, some network benefits might be eroded. It might result in the reduction of individual fares but possible increases in the cost for services that involve connections between the services of more than one operator. The needs of mobility-impaired travellers might receive less attention (e.g. where assistance is required to change from one operator to another or where costs of providing such access might be targeted by new entrants) unless the wider legislative framework protects against such circumstances.

8.5.6 Examples

The 1986 deregulation and privatisation of buses in Britain (outside London) allowed, subject to certain quality and safety standards, any bus operator to compete for any route at any price.

8.6 STRENGTHENED INDEPENDENT REGULATION

8.6.1 Description

A government body which sets the framework in which all relevant operators have to work.

8.6.2 Problems Addressed

The problems are of different types depending on whether there is a lack of coordination or insufficient competition or lack of transparency about charges (not just within one mode but across modes). Lack of co-ordination (unbridled competition) can lead to fragmented decision-making at the operational level and hence to failures to coordinate operations and services to the full benefit of the passenger. Lack of competition could, on the other hand, result in failure to provide services which the customers really want. Either event would be detrimental to the long distance traveller whose journey includes a local leg and might frustrate the pursuance of public policy goals.

8.6.3 Applicability

Where there is a competitive market for the provision of the transport services that might be used by long distance travellers whose journey includes a local leg.

8.6.4 Performance

Cost The costs of setting up a regulator and its operating costs will involve significant costs.

Technical feasibility There is no evidence that technical feasibility will pose a problem.

Financial feasibility Costs are likely to fall mainly on government.

Organisational feasibility Operators are likely to resist having to work under the rules of the regulator.

Acceptance by users User reaction to regulation is likely to be positive – unless it is perceived as stifling innovation.

Other aspects of political acceptability No problems are expected.

8.6.5 Likely Impacts

The interests of disadvantaged (low income or mobility impaired) travellers and of minority groups are likely to receive greater priority.

8.6.6 Examples

There are several examples of independent regulators in mono-modal markets – notable among them being the UK rail market and, increasingly, most other EU rail markets.

8.7 TENDERING/FRANCHISING/CONCESSIONING

8.7.1 Description

To allow operators to compete for the permission to operate a service, with varying degrees of freedom once that permission is granted. With tendering, the detail of what is to be delivered and how it is to be delivered is closely specified, where as with franchising more freedom is given to the successful franchisee to vary what they deliver, so long as key performance indicators are achieved. Concessions are similar to franchises but in addition tend to involve the transfer of fixed assets (stations, track, highway etc), as well as granting the concessionaire considerable freedom on how they use and combine inputs, so long as a specified set of outputs are delivered.

8.7.2 Problems Addressed

This is the principal alternative if neither a state-run operation on the one side nor a free market on the other appears desirable. It provides a set of mechanisms for securing the benefits associated with competition, via competition 'for' the market, whilst retaining the benefits of regulated monopoly by awarding operators exclusive rights to operate in particular markets.

8.7.3 Applicability

Wherever commercial provision is not sustainable but the accessibility of the region has to be ensured. Also, wherever the financial and other benefits of a private sector operation is sought, but the public authority wants to keep control of the framework in the operator works.

8.7.4 Performance

Cost The costs of setting up and administering will be significant.

Technical feasibility There is no evidence that technical feasibility will pose a problem.

Financial feasibility Costs are likely to fall mainly on government.

Organisational feasibility Where there is insufficient competition for the franchise or concession, the concept is not effective.

Acceptance by users No evidence of user acceptance posing a problem.

Other aspects of political acceptability This may be politically contentious.

8.7.5 Likely Impacts

Impacts on travel options, traveller costs and journey times are likely to be positive.

8.7.6 Examples

There are plenty of examples all around Europe and the world, not only transport related ones, but in all sorts of business areas. A well known example of tendering is provided by buses in London. Details of tendering of air services on Public Service Obligation (PSO) routes in Europe are available electronically¹⁰². Franchising is already in place for most passenger rail services in Britain and for selected rail services in Denmark, Germany, Sweden and elsewhere. Examples of concessions include light rail systems in Britain and heavy passenger (and freight) rail services in South America.

8.8 SERIAL MOTORWAY CONCESSIONS EN ROUTE TO MAJOR PORTS/AIRPORTS

8.8.1 Description

Provision for short motorway links leading to major ports or airports to be operated by the same concessionaire that runs the longer distance links which are used in conjunction with the shorter link. It is assumed that regulation, or competition between concessionaires operating alternative routes to the port or airport, prevents excessive mark up prices on any one route.

8.8.2 Problems Addressed

Fragmented concessions can also lead to poor interconnectivity (e.g. the need to purchase several motorway tickets on a single journey).

If serial links in a chain are controlled by different operators, each will add a mark-up to their prices while disregarding the loss of business he inflicts on both the "upstream" and "downstream" operators

¹⁰² http://ec.europa.eu/transport/air/internal_market/doc/2009_11_03_pso_inventory.pdf (last opened 1/02/11)

(this situation is known as “double marginalisation”); the outcome is a level of tolls that exceeds the optimal level by a potentially large mark-up. Furthermore, if externalities (e.g. congestion) exist between a motorway and neighbouring links, these externalities have consequences for social efficiency if the motorway is privately operated. Small and Verhoef (2007)¹⁰³ and Verhoef (2007)¹⁰⁴ show that if each link in a serial network is controlled by a different private operator, a private operator internalises not only the congestion externality of its link, but also that of the other links in setting the toll.

8.8.3 Applicability

This solution is clearly only relevant where motorways are operated by concessionaires (rather than, for example, by a single national authority). It would be inappropriate where a concessionaire would have an unregulated monopoly because monopoly concessions can lead to excessive mark up prices or poor service and thus to poor interconnectivity between “local” motorways and long distance public transport modes (or between long distance motorways and local roads or motorways). Regulation or competition can help keep tariffs at the optimal (social marginal cost) level.

There are several examples in Europe where serial motorway links are managed by different operators. For example, consider the motorway A4 crossing the northern part of Italy: the connection between the cities of Turin and Venice is managed by three operators. In particular, Satap s.p.a manages the link connecting the cities of Turin and Milan, Autostrade per l'Italia s.p.a operates the link between the cities of Milan and Brescia, while the operator Autostrada Brescia-Verona-Vicenza-Padova s.p.a. manages the link connecting the cities of Brescia and Venice. Furthermore, this motorway is an access route to important airports such as Malpensa and Orio al Serio.

8.8.4 Performance

Cost The main costs concern the realisation of a vertical integration. The amount of costs necessary for an operation of vertical integration is subject to a number of variants, but, if an existing concessionaire is involved and the additional links managed are not many, such costs are not expected to be particularly high. At the same time, economies of scale (and consequently cost savings) may arise by an integrated management during the operating period. Given the high dependence on the specific context, it is not possible to quantify a general cost of this solution.

Technical feasibility No particular hurdles exist.

Financial feasibility The effect of the described solution, with its in-built control of any exploitation of a monopoly position, is likely to be a decrease of tolls. Therefore a reduction of revenues is expected, even if an increase of the demand partly counterbalances such a reduction. At the same time, economies of scale (e.g. in administration and operating costs) may emerge leading to the total costs of a vertical integration being lower. Therefore, the financial results vary according to cases.

Organisational feasibility Different actors (e.g. current operators) might appeal against the introduction of a single concession for operating complementary motorway links. In addition, changes of the legislative and regulation frameworks would be necessary to allow the operation of a vertical integration.

More generally, there are several constraints on the operation of this solution. First, if multiple concessions are involved, the current concessions periods have to be considered (though the existence of current contracts is not an insurmountable obstacle for the introduction of a sole concession). A second problem is that the motorway sectors of specific countries typically involve a wide range of actors (operators, government bodies, etc.) and so there are many differing interests to conciliate. In addition, financial compensations to current motorway operators could be necessary for making possible their replacement with a single operator. Such final compensations could be borne by the “new” concessionaire, which “buys” the other concessions. Anyway, there will be transaction

¹⁰³ Small, K. A. and E. Verhoef (2007), *The Economics of Urban Transportation*, Routledge

¹⁰⁴ Verhoef, E. (2007), ‘Second –best Road Pricing through Highway Franchising’, *Journal of Urban Economics*, 62,337-61).

costs among the parts involved. These issues, whose relevance varies from case to case, have to be properly assessed when considering the possibility of vertical integration.

Acceptance by users The proposed solution aims to reduce the number of current motorway tolls. This would determine benefits for users and therefore the acceptance by them should not be an issue. Users would probably welcome a reduction in the number of toll stations.

Other aspects of political acceptability Political opposition may emerge if vertical integration conflicts with the interest of public parties (e.g. public motorway operators).

8.8.5 Likely impacts

A reduction in the number of toll stations might reduce journey times, increase convenience and remove potential accident hazards. However, if the reduction in the number of motorway tolls results in increased demand, these benefits might be eroded (although, in this case, the concessionaire will be inclined to internalise the congestion via increases in tolls and, perhaps by investing in increased capacity, so the final effect is not clear a priori).

This solution would tend to result in lower tolls and therefore reduced travel costs for users, which would be a particular benefit to low income travellers; however, the overall impact on travel costs depends on the level of tolls that existed before the implementation of the measure.

Potential environmental benefits could be achieved if there is less queuing at toll stations. Also, lower tolls would probably shift traffic to motorways from roads where population is more exposed to polluting emissions.

8.9 JOINT MANAGEMENT OF CAR PARKS AND SERIAL TRANSPORT SERVICES

8.9.1 Description

Ownership or management of car parks at ports, airports and major rail stations by the bodies who own or manage the port, airport or rail station (or co-ordinated management via an agreement between the parties).

8.9.2 Problems Addressed

When different actors manage the two infrastructures, the owner of the car park will set the tariffs to maximize its profits, irrespective of the negative effects (in the form of lost sales) for the downstream operators such as a rail operator.

Lack of co-ordination can lead to higher prices, and poorer service than would be the case if the car park were managed in such a way as to maximise the attractiveness of the combined facility (car park plus interchange point).

8.9.3 Applicability

The effectiveness of this solution depends on the demand elasticity of the downstream services. In the case of car parks near rail stations, part of the potential rail demand is likely to be discouraged by the level of car park tariffs, i.e. the rail demand is more elastic. However, in the case of airports, the air demand is expected to be less elastic and the tariffs for parking cars to have less influence on users' choices.

Given the possible problem of "free riding" (people taking advantage of the reduced car parking tariff even though they are not using the rail or air service), this solution is not applicable if there is not a way to prevent the car park being used by patrons of other facilities adjacent to the rail station or airport (but see below under "organisational feasibility").

8.9.4 Performance

Cost The main costs consist of the transaction costs necessary for developing an integrated system. Costs for operating and promoting the new system have to be considered as well. Given the high dependence on the specific context, is not possible to quantify a general cost of this solution.

Technical feasibility No significant technical hurdles are envisaged.

Financial feasibility Better management of transport demand should be able to generate revenues high enough to recover the reduction of the tariffs of car parks. However, financial results may be very different according to cases and so in depth examinations are necessary in order to evaluate the financial feasibility.

Organisational feasibility In general organisational and legal aspects should not represent relevant issues for implementing such solution. Nevertheless, some problems regarding the agreements among the subjects involved could emerge.

In addition, steps may need to be taken to reduce “free riding” in the car park. It may be possible to link the use of the car park to the possession of a return or season ticket for the downstream services but problems could still occur if the sum of the price of the rail ticket and the cost of the car park for a user is less than the cost of just parking the car for a certain number of hours. Clearly in such situations, even if the proceeds of the services provider increase, there would be no effect on interconnectivity. Therefore integration of rail and car park would need to take account of this problem (e.g. by giving discounts for parking the car only to medium-long distance travellers by train).

Acceptance by users No direct impacts but the described solution should provide improvements of the transport condition for users and, if so, would be popular.

Other aspects of political acceptability There should not be a significant political opposition.

8.9.5 Likely Impacts

Environmental benefits could arise if the solution leads to a modal shift on the “long” leg of the journey from car to a less polluting transport mode. Users would benefit from any reduction in tariffs designed to encourage use of intermodal systems.

8.9.6 Examples

An example of integration between the rail mode and car parks is provided at Karlsruhe central railway station where lower parking charges apply (via a 24 hour flat rate) for rail passengers.

8.10 PRICE REGULATION FOR SERIAL RAIL CONCESSIONS

8.10.1 Description

Regulation to prevent rail infrastructure managers charging excessive access charges on short links which are essential components of longer distance journeys.

8.10.2 Problems Addressed

Unregulated charges on serial links can result in inefficiencies and higher tariffs for rail users. The problem may be particularly serious when a single company controls the concession for a short link as well as for the longer links to which they are connected but can also occur when different companies are involved.

There are currently enormous variations in approaches in setting infrastructure charges. Alexandersson, Nash and Preston (2008)¹⁰⁵ highlight that these variations become particularly problematic where one operator runs over a number of infrastructure providers. This is the case for international services but Bouf¹⁰⁶ presented an interesting situation in France where the Paris-Tours high-speed line is provided by the state (via RFF) but the Tours-Bordeaux high-speed line is a private concession. A theoretical model shows that this situation will exhibit the Bertrand curse¹⁰⁷. If one infrastructure provider reduces its charges towards the optimal marginal cost level, the benefit will be largely captured by the other infrastructure authority. The competitive outcome is thus likely to be too high charges to the detriment of all.

8.10.3 Applicability

The applicability of the solution depends on many factors. In particular, elements such as legislative aspects, the presence of information asymmetries¹⁰⁸ between regulator and regulated subjects, the capture problem¹⁰⁹ of the regulator, etc. could make difficult the implementation of the solution.

8.10.4 Performance

Cost The costs are related to the management of the regulation process over years (e.g. administrative costs, the costs for verifying the behaviour of the operators, data provided by them, etc.). Given the high dependence on the specific context, is not possible to quantify a general cost of this solution.

Technical feasibility No significant hurdles exist from the strictly technical point of view.

Financial feasibility The solution aims to reduce the infrastructure charges and this may determine a decrease of the proceeds of the rail infrastructure managers. Therefore public subsidies may be necessary.

Organisational feasibility Possible change of legislative framework could be necessary for developing a regulation activity. Organisational aspects concerning the functioning and roles of the regulation authority have to be assessed as well. Typically, the regulation of rail concessions is not a simple task, but the level of difficulty depends on the features of the considered context.

Acceptance by users The introduction of price regulation would produce benefits for the users in terms of lower tolls and so it should be desirable for users.

Other aspects of political acceptability There is no reason to anticipate particular political opposition.

8.10.5 Likely Impacts

The described solution would tend to result in lower charges – which will be particularly beneficial for people on low incomes.

8.10.6 Examples

Specific examples include the unregulated Heathrow Express and Arlanda Express.

¹⁰⁵ See: Alexandersson G., C. Nash and J. Preston (2008), Risk and reward in rail contracting, Research in Transportation Economics, 22, 31–35

¹⁰⁶ Bouf D., One train operator and two infrastructure managers: a simple model to explore the issue of infrastructure charging. Thredbo 10 conference.

¹⁰⁷ Bertrand curse: All of the infrastructure managers should benefit from a decrease in infrastructure charge but the one that actually decreases its charge will benefit less than the others.

¹⁰⁸ Information asymmetries may occur when regulator has less information than the regulated subject.

¹⁰⁹ The capture problem of the regulator may occur when regulator is influenced by regulated subjects.

8.11 COORDINATION BETWEEN LOCAL PUBLIC TRANSPORT OPERATORS AND LONG DISTANCE RAIL PROVIDERS

8.11.1 Description

Coordination, or formal contracts, between the operators of local public transport and of long distance rail services (perhaps by extension of an existing arrangement among local operators, or by metropolitan /regional public bodies, to include the operators of the long distance rail services). At another level this could be extended to include airports and air carriers. The principle is the same.

8.11.2 Problems Addressed

Uncoordinated provision of services and of prices leading to higher prices and less attractive services for journeys involving local public transport and long distance rail. The general idea is that co-ordination would allow prices to be set, and services scheduled, so as to encourage travellers to use a combination of the long distance rail and local public transport services.

8.11.3 Applicability

Where the possibility of through journeys using a combination of local and long distance rail exists. This solution might be particularly relevant if price rises by local operators threatens the market for the long distance services.

8.11.4 Performance

Cost The main costs are the transaction costs borne by the operators for setting the contracts. Given the high dependence on the specific context, it is not possible to quantify a general cost of this solution.

Technical feasibility No significant hurdles exist.

Financial feasibility The financial feasibility depends on the context of application. The key issue is understanding whether the additional demand on long distance services would be able to compensate the financing of the reduction of tariffs for the local services.

Organisational feasibility If the demand conditions make possible a voluntary agreement among the operators involved, organisational feasibility should be not a relevant issue. However, steps might need to be taken to avoid the price reductions intended for travellers using a combination of local public transport and long distance rail being taken advantage of by travellers using just the local (or just the long distance) elements.

Acceptance by users This solution is expected to be desirable for users, since it would produce cost savings on the short distance public transport services.

Other aspects of political acceptability There is no reason to anticipate any particular political opposition.

8.11.5 Likely Impacts

Better co-ordination might reduce transfer times and thus increase convenience and reduce overall travel time. Decreased charges on local public transport could be quite significant – and might be particularly welcomed by low income travellers - but their amount would vary according to local circumstances.

8.11.6 Examples

Coordination in Germany makes it possible for rail tickets issued to rail card holders by Deutsche Bahn for long-distance travel (i. e. exceeding distances of 100 kilometres) to include the usage of public transport at the town of destination.

8.12 COORDINATED POLICY FOR MANAGEMENT OF AN INTERCHANGE'S ACCESS MODES

8.12.1 Description

A co-ordinated policy for the management of an interchange's access modes in the interests of overall efficiency. This might be expected to occur naturally if there is unified ownership, control by a strategic authority or if a voluntary agreement is in place (see solutions 8.1, 8.2, 8.3, etc), but is not guaranteed – other objectives might prevail. This “solution” refers specifically to the adoption of an agreement to manage the access modes in the interests of overall efficiency. Such an agreement should allow decisions on infrastructure provision, service levels and prices to be taken in the light of their implications for the efficiency of access irrespective of mode used.

An efficiency-oriented policy should lead to a more efficient overall provision and use of available capacity. This might come about by the introduction of a pricing scheme which increases demand for under-utilised capacity while reducing it for capacity which is fully utilized or where the marginal operating costs are greater. However, it should be noted that an efficiency-oriented policy would not necessarily improve interconnectivity (efficiency might be maximised by pricing some users off the network).

8.12.2 Problems Addressed

Separate planning and management of the different access modes can result in an inefficient allocation of resources and a mismatch between supply and demand. This in turn can create congestion on some modes and higher than necessary prices for others and consequently can result in less attractive conditions for long distance travellers.

Appropriate pricing of the car parks and of the access roads can help to adjust demand so as to make most efficient use of the available capacity.

8.12.3 Applicability

Wherever there is an issue of over (or under) provision of capacity in the access modes serving the interchange or where there are wide variations in the marginal costs of providing access by the different modes. For example, when there is congestion on the access roads, improvement in the attractiveness of public transport (by reducing its costs or increasing the level of service or by increasing the costs of the car mode or car park) could reduce the access times for motorists as well as benefitting public transport users.

8.12.4 Performance

Cost Even where several different parties are involved (e.g. airport manager, car park operator, public transport operator), the direct costs of agreeing a co-ordinated policy should be relatively modest. However the costs associated with the implementation of the agreement could be very large – particularly if they involve investment in new infrastructure. Actual costs are, of course very context specific.

Technical feasibility No specific hurdles exist.

Financial feasibility No specific issues (it should, in principle, be possible to define a policy which is financially neutral or even generates profit).

Organisational feasibility Organisational and legal issues could present serious obstacles.

Acceptance by users The proposed solution should provide improved transport conditions and so would be desirable for users but this is not guaranteed. An efficiency maximising policy might result in prices which drive some users off the network – this would not be popular!

Other aspects of political acceptability Political opposition could occur if one party is seen to be disadvantaged or if the goal of efficiency is compromising other objectives (e.g. maximum traffic).

8.12.5 Likely Impacts

Efficient management of the access modes should, in theory, result in a reduction in average costs. But this is not inevitable - efficiency might be maximised by pricing some users off the network. Travel time savings would arise if the solution leads to a reduction of congestion, an increase in service frequency or even to the introduction of new long-haul flights due to higher passenger volumes from an extended catchment area. Environmental benefits could arise if the solution leads to a reduction of the car journeys to and from airports (but this is not guaranteed – a commercial approach to pricing of car parks and access roads might lead to an increase in journeys).

8.12.6 Examples

The manager of the Edinburgh airport developed, in accordance with the objectives of the government transport policy, a strategic plan (Edinburgh Airport Surface Access Strategy 2007-2011) in order to improve the access conditions for users. In the framework of this plan, among the various measures, the airport manager proposed to encourage the move from the "kiss and fly" option to the "park and fly" one through the application of proper parking charges.

8.13 SYSTEM FOR FAIR DISTRIBUTION OF TICKET REVENUE

8.13.1 Description

A system for the distribution of revenues, from ticketing initiatives involving more than one operator which is perceived by all parties to be fair. A key aspect of this perception is the use of actual usage and joint costs incurred as key drivers for the distribution of revenues. This necessitates introduction of a means for accurate counting of users. Existing systems tend to be based on: 1) Estimated usage of the system – based on statistical extrapolation of sample counts, 2) data on sales of the different tickets/subscriptions, 3) The estimated "fare evasion" rate per transport company, and 4) Calculation per mode and per company of the fare related to the average trip length (expressed in km). This methodology can be much improved if more information is available on actual usage.

8.13.2 Problems Addressed

The perception that the distribution of revenues will not be fair or beneficial to themselves discourages operators from participating in the joint ticketing ventures which feature in many of the solutions identified elsewhere in this document (e.g. solutions involving joint ticketing between long distance operators and short distance operators, or between operators who, between them, offer a range of services for the local leg of a long distance journey).

8.13.3 Applicability

Wherever the introduction of a joint ticketing venture would bring benefits to long distance travellers whose journey includes a local leg (see Solutions in chapter 6).

8.13.4 Performance

Cost The cost of the counting (manual or automatic) and data analysis non-trivial. Apart from investment cost there are significant operating costs for such a system. In province of Bolzano/Bozen yearly costs of this type of system are calculated at €5 million.

Technical feasibility No insurmountable obstacles (counting can be done manually or automatically). The manual option requires regular manual counting at all vehicles/stations of participating companies but is subject to mistakes by personnel especially in crowds and/or busy hours. Automatic counting requires electronic devices in each vehicle in operation, communications links and appropriate software.

Financial feasibility The financial feasibility of integrated ticketing zone increases with introduction of fair revenue sharing. It creates incentives to reduce costs by particular operators as they cannot compensate losses from common revenue. Also revenues are much higher than operational costs of the system (in Bolzano/Bozen the cost is €2.5 million and revenues are €21 million.)

Organisational feasibility Requires many bilateral agreements between participating companies. Contracts tend to be complicated and revenue distribution based on designed formulas. The process could be difficult as some companies might not be satisfied with revenue allocated.

Acceptance by users Not an issue for end users

Other aspects of political acceptability When public sector companies and private companies are involved political decision is necessary due to fears of redistribution of public funds to private entities. Public companies may not be willing to participate due to fear of losing subsidy if it is not directly linked with their operations.

8.13.5 Likely Impacts

Cost reductions and increased convenience can be expected to come about for users, if the existence of such a system results in through ticketing and a unified tariff.

8.13.6 Examples

In the Pomerania region of Poland, regular manual counting is used to determine a fair distribution of revenues between the Tricity transport boards (the Gdynia and Gdansk City Transport Boards) and SKM Rapid Rail. Prior to the existence of this procedure, the operators had been reluctant to participate in the introduction of a common ticket in the Pomerania region. The counts also contribute to demand forecasting and hence to the development of plans.

An electronic system has been successfully introduced in Bolzano/Bozen region. The distribution of the ticket revenues is based on the passengers actually carried by each single company. This is possible because the on-board ticket machine installed on the vehicle recognizes the operator from which the ticket has been bought. The revenues are then distributed to each operator via a compensation criterion which reflects the km “consumption” per ticket.

In the Italian region of Campania the implementation of a central Elaboration Data Centre (CED), which will be connected with the local Elaboration Data Centre of each transport company is planned. The central CED will process the information on ticket sales and on the ticket types (soon) to be replaced in order to compute the revenues and to divide them among different carriers on the basis of the carried passengers.