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Study “Towards a European Multi-Modal Journey Planner”

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E X E C U T I V E S U M M A R Y

Framework, objectives and scope

The present study has been commissioned by the European Commission, DG Mobility and Transport. It was carried out within the policy framework of the ITS Action Plan, the Action Plan on Urban Mobility and the ITS Directive, that calls for promoting and supporting EU-wide multimodal travel information services¹. In a wider context, Vice-President Kallas, Commissioner for Transport, has launched a Journey Planner Challenge to industry and stakeholders in June 2011², and multimodal travel is a key part of the European Commission's strategy for the future of transport³.

The objective of the present study is to support the EC's work towards a European multimodal journey planner, and to prepare the elaboration of functional, technical, organisational and service provision specifications as required by the ITS Directive.

A multimodal journey planner (JP) is an IT system able to propose a set of one or more transport services answering at least the question "How can I go from location A to location B at a given departure/arrival date and time and under which conditions". The most common point of access to such a journey planner is via a specific web service. For example, www.destineo.fr, www.trafiken.nu, www.anachb.at are multimodal journey planners.

The scope of multimodal journey planning has many dimensions. It can be defined in terms of:

- transport modes
- geography
- media channels
- information content
- use cases
- ... and many more dimensions.

The present study considers scheduled terrestrial collective transport services as the core object of multimodal travel information. This view is confirmed by the stakeholder responses to the consultation as part of the study. Multimodal journey planning does not exclude any transport mode by principle, in particular not the use of individual motorized vehicles.

A strong limitation of scope, which is inscribed in the policy framework, consists in considering journey planning as a specific topic, distinct from buying a ticket. This is a policy choice and gives rise to a stepwise approach ("seamless travel information first, seamless tickets later"). Again, this view is largely confirmed by the stakeholder response

¹ ITS Action Plan: COM(2008) 886. Action Plan on Urban Mobility: COM(2009) 490. ITS Directive: 2010/40/EU.

² www.eujourneyplanner.eu

³ See 2011 Transport White Paper, COM(2011) 144 final, especially initiative 22.

to the present study, but it must be borne in mind that for travellers as well as for transport operators, journey planning is often tightly interwoven with buying a ticket and with on-trip information, and that the overlap between these situations will further increase with the rise of mobile devices.

The study has been elaborated between January and September 2011 by a team of consultants with previous involvement in multimodal journey planning. The results are based on existing work from previous projects and on stakeholder feedback (Survey and Workshop).

Assessment of existing services and standards

The present report reviews recent projects that have analysed user needs and functionalities of a European journey planner. It is observed that there is no agreed hierarchy of functional user needs –the variety of use cases and of the scope under consideration is too wide in different projects. At the June workshop, user organisations have pointed to reliability as a prime user need.

The report describes examples of multimodal journey planners on regional, national and international level. There are no general conclusions how to define success, since the rationales of each example are very different. Each example proves by its existence that the rationale behind it is relevant.

The present report addresses technical issues, in particular the question of distributed vs. centralised journey planning. It is noted that the analysis of system architecture systematically leads to the analysis of the organisational background of a given journey planner.

Different governance schemes and business models are reviewed. It is observed that there is no self-contained value chain of multimodal journey planning in general, because end users usually do not pay for this service as such. There are, however, examples where a self-standing value chain has been constructed through the stabilising intervention of public authorities.

Four main types of business cases are distinguished.

- Journey planning service is a part of the transport service. The user feels that he or she pays for the information through the ticket price.
- Journey planning service is a part of public policy. The user pays through his or her taxes. This is the typical situation where public authorities directly provide or fund a journey planner because they assume the socio-economic business case.
- The media business model: Journey planning is information content that attracts audience for advertising.
- Other forms of bundling than with the transport ticket: one can imagine that the service offers associated to mobile devices, to telecom subscriptions, to payment

means etc., will in the future contain multimodal journey planning. For real-time data in car navigation, this is the dominant business model at present.

Mixed forms of these types can be found in practice. Each type has the potential to disturb or destabilise the others, when they co-exist.

Finally, the report reviews the standards. It is observed that the existing standards provide for rich data interchanges enabling EU-wide multimodal journey planning with a high level of service. Further improvement and extension is possible but not indispensable for reaping the benefits of existing standardisation. The most widely accepted official standards - Transmodel, IFOPT, SIRI, NeTex – result from a process of convergence of different ancestor standards. They are non-prescriptive in terms of distributed vs. centralised system architecture.

TAP-TSI is an essential context element because it defines the standard information content on rail timetables that shall be made available on a regulatory basis. The TAP-TSI regulation introduces a strong delimitation of scope, because it stipulates that information on rail timetables shall be available to all, while tariff information is reserved to railway undertakings and authorised third parties and public bodies only, and real-time information is not addressed.

Stakeholder feedback

Stakeholder feedback has been collected during the study through an on-line survey, conducted under the direct responsibility of the EC, and through a workshop, organised by the study team. The results of both components have been published separately from the present report on the Commission's website⁴. The stakeholder response was strong and has confirmed their high interest in the topic.

Stakeholders are quite consensual:

- on the fact that a multimodal JP is a strong tool for promoting modal shift,
- that rail and terrestrial public transport are central pillars of a European MMJP while road, air and ferries appear as further important modes,
- with the stepwise approach of DG Mobility and Transport (journey planning first, ticketing later),
- that data reliability is a prime need,
- that the organisational issues are most challenging,
- that the role of the European Commission should be an active one especially when it comes to establishing a legal framework and promoting standardisation.

Stakeholders express a quite consensual preference for distributed solutions, because these correspond better to existing organisational structures, facilitate adequate allocation of responsibility for data quality, and accommodate issues related to data ownership.

⁴ http://ec.europa.eu/transport/its/index_en.htm

There is awareness of the organisational and technical limits of distributed solutions, especially concerning real-time data.

No consensus appears concerning the business models. While some stakeholders see a priority in constructing a solid business model for a publicly controlled reference service on national levels with a European layer on top of it, others see the priority in creating a European market for traveller information data.

The principle of open data access is supported by most, although in various scopes (e.g. should it extend to real-time information or not) and depending on the conditions. The use of legislative instruments for opening data access is claimed by some, on the grounds that it makes data access enforceable, that it provides security for investments in new services and market development, and fosters third party business esp. SMEs; it is opposed by others, on the grounds that it is disproportionate, that it puts new burden on the operators, and that the operators' incentive for adding value to data is lost when the benefits are mandatorily shared with competitors.

Conclusions and issues

In response to key questions formulated by DG Mobility and Transport, the present study shows that the stakeholder's view on the feasibility of a European journey planner and their willingness to cooperate in such a common scheme is subject to their concerns regarding the organisational challenges and to a lack of consensus on an appropriate business model. As a way out of this situation, the study recommends a policy of open data access, such that EU-wide journey planning services could be offered by different actors according to different models of cooperation.

In consequence, the present study does not yield a preferred option for the technical architecture and the governance of a single European scheme. It does not require that a consolidated national system exists in those countries that do not have it yet, because JP providers can build cross-border services from more decentralised data sources where a national consolidation does not exist. For reaching the goal of full geographical coverage of multimodal journey planners, the recommendation is that the EC supports the production of data that do not exist today independently of national consolidation (see recommendation 4 below).

In response to the question on the most suitable approach for connecting legacy systems in an efficient and effective way and open for extensions, the finding is that the existing standards provide for rich data interchanges enabling EU-wide multimodal journey planning with a high level of service. Further improvement and extension is possible but not indispensable for reaping the benefits of existing standardisation. The most widely accepted official standards - Transmodel, IFOPT, SIRI, NeTEx – result from a process of convergence of different ancestor standards.

The cost of connecting legacy systems lies in adapting them to the standards by developing appropriate interfaces. The cost is minimised by prescribing the existing standards, since these result from a process of convergence of significant national ancestor standards that have been used in important legacy systems. Putting the technical prescription on a regulatory basis secures the value of the money spent for the system adaptations. If the approach of open data access is followed, then there is no need for further consolidation of standards prior to their prescription.

Several issues remain for further analysis, such as the more precise definition of the conditions for data access by third parties, the allocation of responsibility for data reliability, the question of liability in case of erroneous information by third parties that would entail financial claims by travellers, and the status and future evolution of the TAP-TSI implementation.

Summary of vision and recommendations

The study formulates a vision and recommendations in support of future EC work towards EU-wide multimodal journey planning. The recommendations express the study team's view and have not been adopted or in any way approved by the European Commission, DG Mobility and Transport.



The vision is that multimodal journey planning is a service to citizens, delivered by many actors, in a non-exclusive way.

The vision is based on the principle that any actor has access to data for journey planning on any network.

The benefit of this vision is that it allows different business models to co-exist, and the obstacles to a single European journey planner scheme to be overcome. It fosters the emergence of a variety of services, public and private, that will address a large variety of user needs.

Open data access does not exclude fees for data access, and conditions of use. However, fees and conditions must be limited, justified and must ensure fair competition among transport operators and third-party operators.

Policy recommendations

- 1  Regulate the access of JP providers to data produced by public authorities and by commercial operators of transport services and facilities.

It is recommended to use a legislative instrument for implementing open data access.

Data access conditions shall be in conformity to technical standards, eventual fees in line with general principles and limits, and conditions of use as far as necessary for protecting the quality of information, the operational interests of the transport operators and authorities in situations of incident management, and the policy goals of transport authorities.

- 2  Progressively extend the scope of legislation on data access.

This goes with the stepwise approach of DG Mobility and Transport. Starting from the core of scheduled terrestrial collective transport, it is recommended to progressively extend the scope of content especially towards air transport, road traffic and parking data, real-time data, and towards fare and ticketing information.

- 3  Coordinate EC policy on different transport modes and on data access.

Ongoing developments of particular relevance in the context of multimodal journey planning are the TAP-TSI regulations, regulation on information on air transport through computerised reservation systems, increasing availability of road traffic and parking data, and the implementation of the INSPIRE Directive.

- 4  Support Member States, local authorities and industry in the production of data that does not exist today.

Gaps in data coverage must be completed in a way that is economically efficient and that ensures that all data are subsequently maintained up-to-date. It is recommended to give the initiative for completing gaps in data coverage to decentralised public and private stakeholders in multimodal journey planning, who are better suited for conducting the task according to specific political priorities and economic conditions, and who should be supported by the EC.

Technical recommendations

- 5  Ensure technical interoperability of data from different sources.

The core public transport data set for EU-wide interoperability of journey planning services are shared reference data on “stop areas” as defined by IFOPT. It is recommended to define IFOPT as mandatory standard for these reference data, and to ensure proper coordination of how IFOPT is applied by each Member State.

It is recommended to lay the obligation of maintaining reference data on stop areas on each Member State for its territory, leaving each Member State free to allocate the responsibility within its jurisdiction and to determine how this activity is financed.

- 6  Monitor the compliance to the rules concerning data access.

Legal means for enforcing the implementation of the rules on data access will be given by usual infringement procedures.

- 7  Define budget needs for upcoming EC finance programs.

It is recommended to assess the opportunity of financial support by the EC especially for creation of data coverage where it does not exist today, for technical adaptations to existing systems in order to ease the migration to standard formats, for the EU-wide coordination of the management of reference data on stop areas, and for projects that address the issues related to the future extensions of open data access in the areas of fare and booking data, real-time data, etc.

At last, the report sets out what to include in the specifications required under the ITS Directive.

T A B L E O F C O N T E N T

1. Introduction	12
1.1. Policy framework	12
1.2. Objectives of the study	12
1.3. Definitions	13
1.4. Scope	13
1.5. Abbreviations	14
1.6. Methodology of the study	15
2. Existing definitions of needs and functionalities of a European Multi-Modal Journey Planner	16
2.1. Results from LINK	16
2.2. Results from i-Travel	19
2.3. Results from WISE TRIP	21
3. Evaluation of typical current journey planners	24
3.1. Introduction	24
3.2. Example A : transport-idf.com	24
3.3. Example B : vialsace.eu, jv-malin.fr	26
3.4. Example C: Rejseplanen	27
3.5. Example D: Transport Direct	28
3.6. Example E: IDOS Czech Republic	34
3.7. Example F: EU-Spirit	37
3.8. Example G: Google Transit	40
4. Technical aspects	43
4.1. System architectures for interconnected journey planning	43

4.2. System architectures for delivery to end users	47
4.3. Verification of conformity to defined data formats	49
5. Governance and business case	50
5.1. Existing JP governance schemes	50
5.2. Existing JP business cases	51
5.3. Stakeholder imperatives	53
6. Review of standards	54
6.1. Introduction	54
6.2. Standardised data models	55
6.3. Data interchange standards	59
6.4. Standards for distributed journey planning	61
6.5. TAP-TSI	61
6.6. Data quality	63
7. Stakeholders views	64
7.1. Stakeholder Consultation	64
7.2. Stakeholder Workshop	64
7.3. Synthesis	65
8. Conclusions and Recommendations	67
8.1. Vision and issues	67
8.2. Key questions addressed to the present study	72
8.3. Recommendations	75
8.4. What to include in the specifications	83

1. Introduction

1.1. Policy framework

The present report is the result of a study for DG Mobility and Transport.

DG Mobility and Transport acts in the following policy framework⁵:

1. The **ITS Action Plan** sets out the “promotion of the development of national multimodal door-to-door journey planners, taking due account of public transport alternatives, and their interconnections across Europe”.
2. The **Action Plan on Urban Mobility** mandates to “support the development of national and regional multimodal journey planners, and links between existing planners, with the ultimate aim of providing users with a public transport travel portal at EU level on the Internet”.
3. The **ITS Directive** requires the development of functional, technical, organisational and service provision specifications for EU-wide multimodal travel information services.

In a wider context, multimodal travel is a key part of the European Commission’s strategy for the future of transport. One of the 2011 Transport White Paper’s goals is to achieve seamless door-to-door mobility. Initiative 22 of the White Paper sets the objective to achieve a framework for a European multimodal transport information, management and payment system by 2020.

To bring the topic onto the agenda Vice-President Kallas has launched a Journey Planner Challenge to industry and stakeholders (see www.eujourneyplanner.eu). The competition for the best planners and ideas has been launched during the course of the present study and is open until 9 September 2011.

The European Commission continues to support research and developments on the topic of multimodal information.

1.2. Objectives of the study

The EC has commissioned the present study in a twofold aim:

1. It shall be a further step to support the European Commission’s work towards a European multi-modal journey planner. The EC builds its policy on the existing project work and on rich information on the state-of-the-art. The present study provides a

⁵ ITS Action Plan: COM(2008) 886. Action Plan on Urban Mobility: COM(2009) 490. ITS Directive: 2010/40/EU.

refined vision, that shall inspire relevant stakeholders to participate in a European door-to-door travel information service.

2. It shall prepare the elaboration of functional, technical, organisational and service provision specifications as required by the ITS Directive. As such it comes up with recommendations of what and how to include in the specifications for EU-wide multi-modal information, especially for the pre-trip information.

1.3. Definitions

A multimodal journey planner is an IT system able to propose a set of one or more transport services answering at least the question “How can I go from location A to location B at a given departure/arrival date and time and under which conditions”. The most common point of access is via a specific web service.

In the present context, a multimodal journey planner is also an application delivered to end users by a specific organisation in a distinguishable form, i.e. through its characteristic combination of access channels, brand/service name, coverage, service features etc. For example, www.destineo.fr, www.trafiken.nu, www.anachb.at are multimodal journey planners.

DG Mobility and Transport does not intend to set up and operate a singular European multimodal journey planner under the executive authority of the EC.

1.4. Scope

There is a fundamental limitation of scope in considering journey planning as a specific topic, distinct from buying a ticket, an identifiable sub-part of travelling.

This limitation of scope, which is inscribed in the policy framework, can be criticised. For travellers, journey planning is often tightly interwoven with buying a ticket or being on-trip. For transport operators, it is an essential ingredient of their product, and they use the same data for traveller information and for many other operational needs.

Nevertheless, there are many situations where considering travel information as a topic in itself is fully relevant. DG Mobility and Transport itself sees the realization of multimodal travel information as a stage in the process that leads towards seamless travel; multimodal ticketing is a later stage. The present report endeavours to comply as fully as possible with the scope inscribed in the policy framework, in particular when it comes the limit between travel information and ticketing.

Multimodal journey planning itself has many dimensions. Its scope can be defined in terms of:

- transport modes
- geography
- media channels
- information content
- use cases
- and many more dimensions.

The present study considers scheduled terrestrial collective transport services as the core object of multimodal travel information. This is common use of the term in the ITS professional community, and has been confirmed by the stakeholder responses collected for the present study. It does not exclude any transport mode by principle, in particular not the use of individual motorized vehicles.

On this basis, we inherit elements of scope of many previous projects on which the present work is based, and which often reflect the particular genesis and institutional context of each project.

Indeed, delimiting the scope of multimodal journey planning is part of policy making. And the question of the scope will therefore be present throughout the report.

1.5. Abbreviations

EMMJP	European Multimodal Journey Planner
MMJP	Multimodal Journey Planner
JP	Journey Planner

1.6. Methodology of the study

The present study has been elaborated between January and September 2011.

The workflow is illustrated below.

The results are based on existing work from previous projects, on statements of participating stakeholders (Survey and Workshop), and on the study team's analysis and expertise.

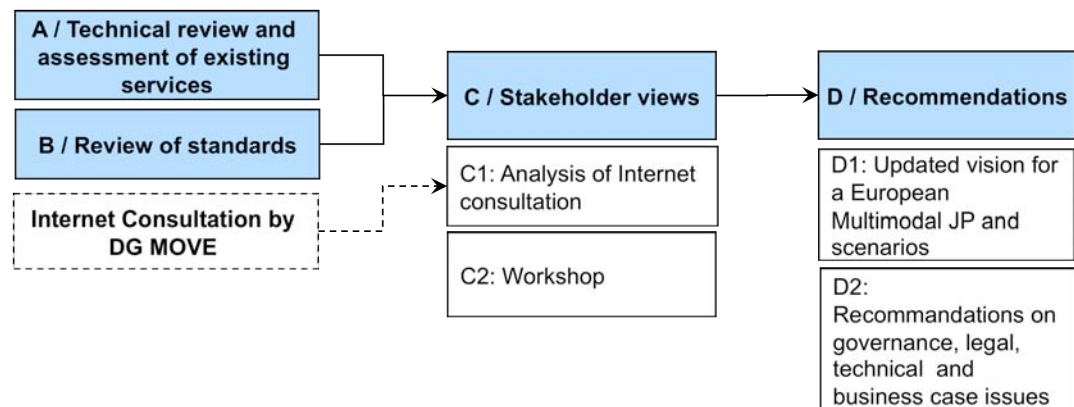


Figure 1 : Methodology workflow

2. Existing definitions of needs and functionalities of a European Multi-Modal Journey Planner

2.1. Results from LINK

The LINK project has organised a European Forum on Intermodal Passenger Travel with a focus on long-distance passenger intermodality (>100km). Part of the project was an expert working group on door-to-door information and ticketing which comprised of highly experienced technical leaders in the area of multi-modal information and ticketing provision, a number of which have built and operated multi-modal journey planners.

The LINK working group looked both at practical and feasible user needs and on the pre-conditions for developing a European multi-modal journey planner. Key points on user requirements made by the expert group relevant to user needs included the following :

Most international long-distance travellers are either very unfamiliar travellers and more familiar but not regular travellers: Their potential discomfort level is high and therefore information needs are also high and heightened by language and currency issues and that there is little standardisation of services across Europe.

Information needs of key relevance to such travellers for multi-modal and inter-modal planning of their journey thus include the following:

1. Reliable timetable information
2. Door-to-door routing including mode transfer ideally with maps for reaching destination at the last mile and support for orientation at interchanges
3. Information on how and where to buy a ticket for local and regional public transport at the interchange point or the operations of key P+R points.
4. Information on where to buy long-distance tickets on line and where to pick up tickets at interchanges/stations (if purchase on departure is being used).
5. Accurate information on expected disruptions (either modelable in advance, e.g. the impact of road works or track works, key to situation specific optimal modal choice in advance trip planning) or real-time due to un-predictable events.
6. Effective door-to-door travel time, cost and emissions comparison of long-distance door-to-door options at least between the public transport options but ideally also against the car option

The latter point means that public transport tariff information needs to be available in the journey planner for the long-distance legs. However, when it comes to public transport tariffs (particularly rail), any trip planning standard must consider that real-time pricing has

many reasons to vary from standard fixed fares and that both operators and retailers continuously adapt prices for a better efficiency to increase the ridership and finally benefit the end users :

- yield management (mainly for long distance),
- loyalty programs,
- concessionary fares⁶, among which some may only be locally available,
- competition between retailers which can apply different margins,
- differences of technical costs between vending channels (e.g. manned or automatic).

Two main types of tariff information might therefore realistically be provided to the customers in association with travel planning without interfering with these practices:

- guaranteed maximum price for the trip,
- possible conditions to get rebates from loyalty or concessionary fares.

Reality : with the possible exception of timetable information and basic (timetable based) route planning, this is far beyond what is currently feasible at a European level based on the consistent availability of data, but however illustrates the increasing information needs with increasingly unfamiliarity. In short providing truly comfort inducing travel information through journey planners for international journeys (excluding the use of taxis for start and end of trips) is a very difficult task.

To summarise the findings of the Working Groups, the LINK experts have drawn up a list of 19 recommendations that highlight “Core measures”, “Short-term measures”, “Low cost wins” and “Forward thinking” measures.

Amongst them is **Recommendation 2** :

Develop a road-map for technical co-operation in achieving a European door-to-door intermodal journey planner (WG 1)

The idea of this recommendation is to develop a road-map for how technically to roll-out a European journey planner in successive stages using a practical approach. This could be part of the feasibility study described in the “White Paper” of recommendation 1 of LINK. Yet this study does not represent this concrete road map.

⁶ In French : tarifs sociaux

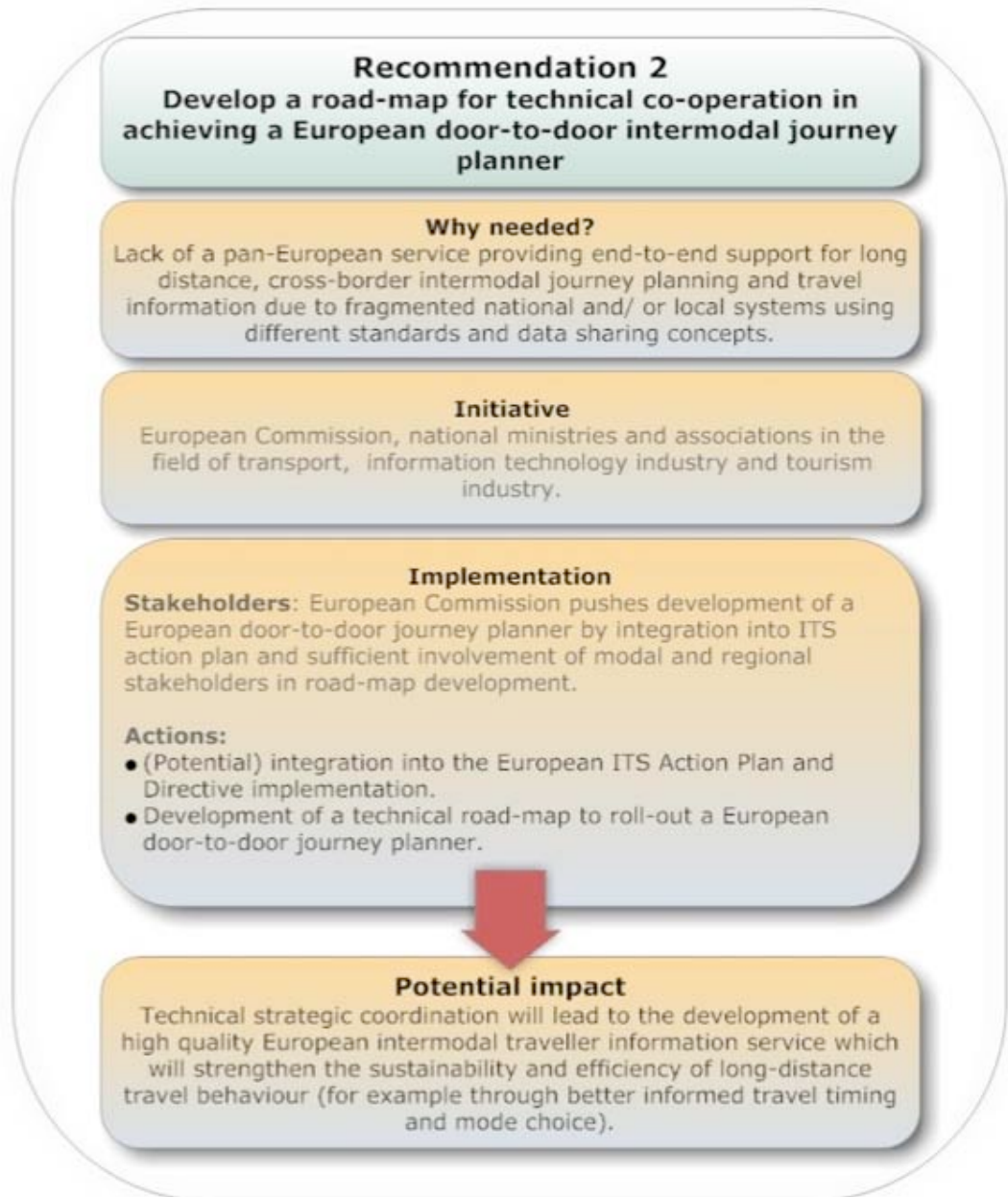


Figure 2: Overview of LINK Recommendation 2

The LINK experts also pointed out that user needs of any European door-to-door JP should be made more precise as part of a separate in-depth study.

2.2. Results from i-Travel

The aim of the i-Travel project (completed in 2009) was to elaborate a platform for the exchange of information between content suppliers and service providers, allowing the “the connected traveller” to receive context-aware, mobile, on-trip event-based information and trip re-scheduling.

As part of its work, the i-Travel project analysed the aims, use cases and processes of the stakeholder groups, but not just for a European JP.

2.2.1. GENERAL ANALYSIS OF USER REQUIREMENTS

i-Travel considered some general findings from recent traveller focussed research to be relevant for specifying the user requirements from the traveller's (and thereby also the supplier) perspective:

Users need to feel in control

People need to feel confident in the way they move in unknown areas. Travellers need to feel in control. Providing travel information is an import tool giving travellers confidence, it takes away uneasiness and anxiety. The importance of this is very high for international trips where familiarity of the traveller with the trip and trip environment is often very low.

Multimodality

Users experience a lot of difficulty combining different modes of transport, not only with information on trains, public transport, flights and traffic but also difficulty finding information about the lay-out and inter-modal linkage of the infrastructure such as stations.

User context

Different user types/characteristics have similar but also differentiation of needs, particularly with regards to their familiarity with the trip and trip environment.

Connecting the real world

Travellers need to have explained to them what kind of information they are being offered. They also need to know where information or transfer connections can be physically found. Travellers need to be able to connect travel information to the real world.

2.2.2. SPECIFIC ANALYSIS OF USER REQUIREMENTS

I-travel identified the following user information requirements, ideally with the easiest possible access to these services, preferably through one service provider and/or portal and through different media as convenient at the time or step of the journey pre or on-trip as appropriate :

Information & Planning needs

- an (online) portal available for real-time (multi modal) travel planning. This portal needs to include present and expected departure and arrival times (taking congestion and delays into account), real-time platform information and alternative routes and modes.
- access to his information (e.g. travel plan, e-tickets) from different devices such as mobile phone and PC.
- an overview of (regional) transport with different modalities with destinations, timetables, prices, itineraries, maps etc.
- an overview of related features of the stations and services transport operators provide e.g. accessibility of the station and rolling stock, toilet services, baggage services, places to eat etc.
- information about congestion and delays.
- information on points of interest (POI).
- information about the number of available parking spaces (e.g. for a Park and Ride)
- information about other services such as a car pool planner, entertainment and interesting trips.
- information about accommodation (hotel) information.

Navigation needs

- to get route information during his trip for all modes (like car, bike and walking).
- to get information on modality shifts (navigation instructions).

Notifications & Alerts needs

- to get personalised traffic information (for public and private travel), including early warning in case of an increasing travel time to a specific location and possible alternative routes and/or modes. (For example: a notice based on predictive traffic information or a travel time forecast).
- to be notified when reaching an important step in his travel (e.g. a change/transfer or when reaching his final destination).
- to be informed when a reserved service is no longer available (or altered).

2.3. Results from WISE TRIP

WISETRIP project is a current Collaborative project co-financed by EU FP7 programme under Theme TPT.2007.4 "The connected traveller in the city, region and world of tomorrow". WISETRIPs main goal is to develop and validate an innovative mobility service platform, which provides and personalizes multi-modal travel information sourced from various connected journey planners and is accessible by travellers before and during the journey at any place and time through various mobile or fixed terminals/devices.

The project provides some useful information on user needs and existing web based JP functionality.

2.3.1. ANALYSIS OF USER REQUIREMENTS

Based on Quality Function Deployment (QFD) method and a House of Quality (HOQ) scheme user requirements analysis in UK, Italy, Spain, Finland , Greece and China indicated that the following needs should have greatest priority in developing WISETRIP (features poorly served but of key importance, weight out of 6)

1. alerting through mobile phone (weight 5)
2. alerting messages (weight 4.3)
3. interurban journey planning (weight 3.7)
4. international door-to-door journey planning (weight 3.6)
5. provision of webs links to booking systems (weight 2.9)
6. online ticket booking (weight 2.9)
7. ticket availability check (weight 2.7)
8. alerting by e-mail (weight 2.6)
9. map based itinerary display (weight 2.3)
10. itinerary display in tabular form (weight 2.3)

The high weight of door-to-door international planning is of particular interest, as is that for alert services and links to booking services as part of the service.

2.3.2. SURVEY OF WEB BASED JP FUNCTIONALITY

As part of the development of this project, WISETRIP has undertaken a survey of JP functionality of 25 Internet based JPs from Europe, China and Japan (WISETRIP Deliverable 2.1, August 2008) and although a little out of date and with a sample defined by response rather than more controlled statistical representativeness, it gives a good idea of the common denominators of existing JPs of different types. The sample included a mix of national and urban planners and gave the following results:

Mode coverage :

- Half the responses were mono-modal planners and half multi-modal.
- Of the multi-modal solutions, half provided only public transport information and half were more car oriented with additional information on public transport in order to facilitate mode choice.

Information provided :

- All JPs provide route information and with the exception of 1 JP time-table /schedule information.
- Fare information or ticket booking is available for rail only and sometimes for long-distance bus travel
- Many JPs provide information on events, news. Dynamic travel time information is provided in only a few JPs
- Walking time for start and end of trip and interchanges in JPs offering PT options in generally provided
- A few JPs provide the cost of a car journey or CO2 emissions
- A few JPs also provide car parking information.
- Almost none have real time information integrated into the route planning or alert facilities but both of these are development priorities of existing services

Geographic coverage :

- $\frac{1}{4}$ of the JPs claimed to be international, mostly small countries with some cross-border links
- $\frac{1}{2}$ of the JPs provided national level information
- $\frac{3}{4}$ of the JPs provided local/regional information

Information display :

- Map based information supported by tabulated results is the general standard
- Some JPs also provide route diagrams

Language : Most national JPs provide information in the native language and in English

Other media for accessing JP info :

- a number of planners offer SMS services
- telephone centres are still very popular and considered essential to avoid social exclusion. Kiosks are rarely used.

Main development priorities :

- real time information and extension of information provision to mobile devices.

Interpretation :

The analysis above gives a reasonable picture of the range of service offer and also the current limited possibilities to offer a unified content at a European level if a distributed approach is to be used.

The only really common data content (where national and regional JPs exist at all) is route and timetable information and most individual countries themselves are a long way from modal and regional integration of their JPs themselves. These facts are perhaps important for a realistic consistent functionality of any initial European multi-modal JP (which for practical reasons can only group existing JP services).

3. Evaluation of typical current journey planners

3.1. Introduction

The objective of the present chapter is to provide factual information on selected examples as a basis for further discussion.

The order of the examples goes from regional to international:

A,B	Regional scale	transport-idf.com, vialsace.eu, jv-malin.fr
C,D,E	National scale	Rejseplanen.dk, Transport Direct, IDOS
F,G	International scale	EU-Spirit, Google Transit.

We have not included any example on the urban scale even if all problems of multimodality can arise at that scale already. We have focused on the regional scale and upwards because that is where all technical and institutional complexity is systematically present.

The selection has not aimed at being representative, but at exploring a variety of cases in terms of governance and business case. Economy of means has pushed us to select examples where information was easily accessible to the study team.

3.2. Example A : transport-idf.com

3.2.1. DESCRIPTION

Transports-idf.com provides multimodal information for the region of Ile-de-France. This region counts almost 20% of the French population.

The website provides a range of services, such as map and timetables consultation, fare information, traffic information messages on scheduled works and possible disruptions due to particular events, and a journey planner. It does not provide real-time information.

The journey planner gives information on public transport exclusively. It covers bus, tramway, subway, suburban train (RER), regional train (Transilien), as well as boats (one scheduled service on the Seine). The fare information gives the general fare tables, it is not integrated into the journey planner.

3.2.2. TECHNICAL ASPECTS

The transport-idf system has been developed to be in accordance with existing French standards. The project is promoter for the use of standardized exchanges and is aware of recent work on European standardisation.

3.2.3. GOVERNANCE AND BUSINESS CASE

This service has been launched in 2000. It was initially created by an association of the public transport operators (OPTILE, RATP, SNCF Idf) and the public transport authority (STIF)⁷. Currently, it is managed by the public transport authority STIF. STIF has been transferred from National Government's control to the control of regional and local authorities in 2005.

Transport-idf is funded by the public authorities, in a context where it is only one of several websites that offer journey planning in the Ile-de-France region. Indeed, the major operators have their own journey planners, ratp.fr and transilien.fr (SNCF). Furthermore, transport-idf has recently signed agreements with third-party service providers such as mappy.fr, in order to provide these systems with public transport data of the entire Ile-de-France region.

3.2.4. INTERNATIONAL FEATURES

Transport-idf is provided in two languages: French and English.

For comparison (status March 2011), the website of Paris urban transport operator, ratp.fr, is available in 7 languages (French, English, German, Italian, Spanish, Dutch and Japanese). Transilien.fr is available in 3 languages (French, English, Spanish). The public transport journey planner on mappy.fr is available in French.

3.2.5. EVALUATION

In terms of audience, the main competitors of transport-idf.com are the major operator's websites (ratp.fr, transilien.fr). There are no official statistics for comparison. On indirect statistics⁸, it can be inferred that the audience of the operators is higher by an order of magnitude, and it is clear that the brand recognition of ratp.fr and transilien.com is by far superior to transport-idf.com. The average traveller will more commonly turn towards the information services of his transport operator. STIF and its website transport-idf stay quite obscure for the general population, even though the word Stif appears on every transport ticket, and public awareness campaigns are regularly conducted by Stif.

⁷ The association is called Amivif (Association for multimodal information for Ile-de-France travelers).
Optile federates the operators besides the two major operators RATP and SNCF).

⁸ Google trends

3.3. Example B : vialsace.eu, jv-malin.fr

3.3.1. DESCRIPTION

This paragraph groups two examples of regional journey planners in France: vialsace.eu for the Alsace region and jv-malin.fr (meaning “I’m travelling smartly”) for the Centre region.

Both sites offer a journey planner covering:

- Bus & tramways on the different urban and departmental public transports networks on the regional territory
- Regional train (TER)

They do not cover the car mode.

Vialsace.eu offers information on fare tables, but not the real cost for a door-to-door trip. It provides information on works, but not real time events.

JV-Malin doesn’t offer any fare information. If the user creates an account, the portal provides personalized information on works.

Both journey planners are recent (start of operation in 2009/2010) and are still working on improving completeness and reliability of the information.

3.3.2. GOVERNANCE AND BUSINESS CASE

By setting up these information services, the regional authorities implement national legislation.

They lead a partnership of the different public transport authorities present on their territory: municipalities and their syndications for urban transport, departments for interurban buses, and the Region itself for railway.

The services are funded by the public authorities. They co-exist with other journey planners, usually provided by the transport operators, that cover some of the networks on the regional territory, in particular regional railway and urban networks.

The Alsace region chose a public-private-partnership approach for implementing and operating the service.

3.3.3. INTERNATIONAL FEATURES

Vialsace.eu exists in French, German and English language. Jv-malin.fr is in French only.

Vialsace.eu is planning to cover cross-border scheduled services, and considering to join EU-Spirit.

3.3.4. EVALUATION

The regional journey planners in France generally have a small audience as compared to journey planners in big cities. Typically, the regional websites account for 200 visits/day with 100 journey planning requests/day, while operation cost is around 200 k€/year. The reason is the small customer basis of occasional and/or interconnected public transport trips at regional scale, and the lack of recognition of the new service brands.

3.4. Example C: Rejseplanen

3.4.1. DESCRIPTION

Rejseplanen and the Danish Road Directorate (DRD) have developed a co-modal journey planner which covers public transport, cars and Park & Ride, for the whole country of Denmark.

The suggested routes are compared on travel time, costs and environmental impact. Car routes use realistic travel times, also in rush hours. These were gathered by DRD through a probe car project using GPS.

The objective is to provide travellers with a complete “live” status for all transport modes, i.e. all relevant information on the current status for all transport modes. Furthermore, the objective is to improve the overall mobility by shifting journeys from private car to public transport or bikes, and to increase the number of car-pooling journeys and combined trips where private car and public transport are combined (Park and Ride), or simply just improve mobility by changing departure time or route.

3.4.2. TECHNICAL ASPECTS

The system’s core is the product HAFAS from the German company, Hacon, which is specialised in travel planning solutions.

Multiple supports and medias are covered (including Google) and various solutions have been developed to spread the use of the journey planner (API).

3.4.3. GOVERNANCE AND BUSINESS CASE

This journey planner was officially launched on October 1, 1998, yet the co-modal version is available since 2007. The owners behind it are national and regional transport companies. The data suppliers and partners include the national road administration, the municipalities, the police and all actors within public transport (trains, buses, metro).

3.4.4. INTERNATIONAL FEATURES

The system is connected to EU-Spirit system and has its own interface to handle European research. It is available in Danish, German and English.

3.4.5. EVALUATION

The planner is now fully operational and deals with between 5.5 and 6 million journey planning queries each month (to compare to the Danish population of 5.3 million people).

This project is unique in that an operator is offering multi and intermodal door-to-door travel planning for the first time.

The inclusion of Park&Ride offers is part of the concept. The implementation shows that it is difficult to inventory the offer and to keep the information up-to-date.

3.5. Example D: Transport Direct⁹

3.5.1. DESCRIPTION

The UK's national journey planning service, Transport Direct, provides a single point of access to information for planning door-to-door journeys locally, regionally and nationally within the United Kingdom (excluding Northern Ireland) primarily via the web portal <http://www.transportdirect.info>.

In 2002, a consortium led by Atos Origin (formerly Schlumberger Sema) was awarded a contract to design, build and operate the portal.

The portal provides an integrated multi-modal journey planning facility covering all modes (rail, bus, coach, ferry, air, taxi, car, cycling, walking), with links to ticket vendors such that users do not need to re-enter information about their planned trip. Users can compare alternative journey options on the basis of time of travel, modes, routes, interchanges, cost¹⁰, walking time and CO2 emissions. They can access maps to help them understand their journey as a whole, or in part. The site is available in two languages - English and Welsh.

Real-time travel news is provided on the portal (including incident information as well as scheduled disruption to services, for example from planned roadworks), but this is not integrated into the journey planning functionality which is based on static data alone.

In addition to the Internet, users are able to access various elements of the service (including real time information) via SMS, mobile phones, PDAs and digital television.

⁹ Much of the following information was taken from <http://www.dft.gov.uk/transportdirect> in March 2011.

¹⁰ Cost comparisons are available for example to allow comparison of uni-modal alternatives (rail, coach or car) for city-to-city and door-to-door travel. Some fare information is missing, for example for local bus services.

3.5.2. TECHNICAL ASPECTS

The technical design of the national journey planning service – as a portal – was conceived as a means of accommodating the enormous diversity of circumstances relating to multi-modal travel in the UK. It has stood the test of time as the service has continued to develop and evolve since its launch in 2004.

In effect it has been possible to provide an apparently seamless national service, while allowing market development and making best use of the systems developed by others within the UK, by harnessing a distributed infrastructure of journey planners and data sources provided by partners.

These diverse facilities have been integrated using standard (national) protocols (e.g. JourneyWeb) and data exchange processes and schemas (e.g. TransXChange, RtigXml, CycleNetXChange). In addition, partly because of the diverse stakeholder community associated with commercial ownership and operation of public transport services in the UK, it has been necessary to develop and maintain certain common elements, such as a National Directory of Public Transport Access Nodes (recording the details and location of 330,000 bus stops, plus airports, rail and coach stations, ferry terminals, tram stops, etc.).

3.5.3. GOVERNANCE AND BUSINESS CASE

Transport Direct was originally conceived as part of the UK government's 10 year plan in 2000 to provide citizens and businesses with better access to information. The Plan set out four strategic objectives for Transport Direct:

- Encourage and stimulate each passenger transport sector to develop high quality and accurate information and retailing systems;
- Enable transport operators and retailers to develop integrated information and ticket sales for journeys involving more than one mode of transport, including, in the long term, how to get to public transport points by car;
- Create a web Portal to enable users to find all available electronic travel information from a wide range of sources and electronic ticket retailers;
- Deliver Transport Direct as an integrated and comprehensive information service for all travel modes and mode combinations, which allows the user to submit their selection to an electronic retailer without re-keying the enquiry.

From the outset Transport Direct created a strong governance structure. Established as a division within the Department of Transport, and led by a Chief Executive, it has an independent Chairman and two Boards:

- An Advisory Board, comprising senior executives from the transport industry provides guidance on overall direction; and

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- A Sounding Board, drawn from operational personnel from the transport industry, which provides advice on how to address tactical challenges.

Ultimately all key decisions on institutional, technical or design changes/updates are the responsibility of the above. The Transport Direct and Travel Information Division contributes to this process, and also assists with:

- Negotiating agreements for the supply of information and journey planning facilities with third parties, and the terms under which such facilities are provided;
- Working with the relevant industries to identify, facilitate and/or encourage adoption of suitable standard protocols and data exchange processes and schemas to enable provision of a national service using distributed systems;
- Encouraging and stimulating each passenger transport sector to develop high quality and accurate information and retailing systems;
- Enabling transport operators and retailers to develop integrated information and ticket sales for journeys involving more than one mode.

The Transport Direct portal uses data and services from over 200 organizations, from both the public and private sectors, including Transport for London, Local Authorities, Point X, the trainline.com, Traintaxi, East Coast, Ordnance Survey, the Rail Settlement Plan, the Association of Train Operating Companies, National Rail Enquiries, National Express, Scottish Citylink, OAG Worldwide, Traffic Scotland, Traffic Wales, Highways Agency, Landmark, Trafficlink and many more. Rail, coach and bus operators provide information either directly or through their partners, Traveline.

The core rationale of the Transport Direct Programme was to try to make better use of existing public transport, road and rail infrastructure in the UK, by improving access to the necessary information. The programme was (and is) funded by the Department for Transport, and the Scottish and Welsh Governments on a non-profit basis, being provided free at the point of use. Though funded by Government, it uses data and retailing services developed and funded by external stakeholders (indeed the passenger transport industry's investment in information and retailing services far exceeds the cost of Transport Direct). Work commissioned by the Department for Transport in 2000 indicated that the services that Transport Direct sought to deliver would not be provided by the private sector and that the Transport Direct could operate as an honest broker for all of the many stakeholders involved.

The capital cost of developing the Transport Direct programme (portal and other necessary works including development and operations) until March 2006 was circa £40 million, and the portal cost £5.9 million in the period from April 2006 to March 2007¹¹.

¹¹ DfT website, response to national archives FOI request January 2006

3.5.4. INTERNATIONAL FEATURES

There are no international features.

3.5.5. EVALUATION

To a great extent, the success of Transport Direct in encouraging better use of existing public transport, road and rail infrastructure is determined by the quality and attractiveness of the transport services recommended to users of the portal.

Major project evaluation until mid 2006

The evaluation framework therefore recognised that it would be difficult to separate out the effectiveness of the portal itself in achieving modal change. Instead it focused more on the portal's visibility, use patterns, use statistics, relative importance as a source of transport information, referrals to ticket retailers, use of real-time information and the extent to which habitual modal choices appeared to be questioned.

The headline findings of the major project evaluation¹² (Nov-02 to May-06) were:

"From a policy and research point of view there is much interest in the nature and scale of the behavioural response resulting from better information services. The pop-up survey does show that for individuals who had made the journey before (about a third of respondents) of these 17% claimed they would change their route, and 24% would change when they intended to travel. This set of respondents also indicated a predisposition to change how they might travel. 7.7% intended as a result of what they found on Transport Direct to use public transport rather than the car, while 2.3% intended to use the car instead of public transport. While these findings are indicative, given the probable bias in the results, it does indicate how travel information can influence behaviour."

"However, compared to established travel planning sites, usage is lower than might be hoped; a clear message is that to have a real impact on behaviour of most travellers in Britain higher penetration of the service will be required. Given resource constraints this is unlikely to be achieved through more extensive marketing alone. So... the most effective growth strategy would be through links from major third party sites where people have an information need, together with the provision of white labelled services through third party brands so that more people could access what current users consider a useful and unique door to door journey planner."

¹² Transport Direct Evaluation, Final Report, March 2007, published by the Department for Transport.

Latest evaluation results¹³

In late 2006, public awareness of the site was approximately 7% of the population compared to circa 15% awareness for comparable public transport websites and 35-50% for road information websites and phone lines generally.

Since the major project evaluation which finished in May 2006, usage has increased nearly 5 fold from about 4 million user sessions per year to nearly 20 million a year in 2010. This indicates a strong repeat business from satisfied users and probably strong growing awareness. An increasing proportion of users access the service from third party web sites and digital TV such as the BBC.

The on-going evaluation of Transport Direct has shown that circa:

- 69% of users are either business or leisure users i.e. the target market of unfamiliar travellers
- 71% are making a new journey
- 63% plan door-to-door
- 22% of trips planned are over 160 km, 55% between 15 and 160km
- The satisfaction rating is well over 80% and well over 90% would use it again
- A majority of users find it somewhat slow (indicating the rate of rising expectations for web services since it started)

3.5.6. BEST PRACTICES AND LESSONS LEARNT

They key lessons that can be drawn from the UK experience with Transport Direct are:

- Such an intermodal service would probably not have arisen without government intervention. Transport Direct with its credibility (as part of the Department for Transport), governance and supervision acts as an honest broker to facilitate the distributed participation of regional planning sites and other data suppliers.
- Strong and clear governance and strong stakeholder engagement is required from the outset, and could benefit greatly from the support and endorsement of transport operators

¹³ Dft website, Wikipedia and extracts from presentations made by Roger Slevin of Transport Direct between 2006 and 2009 and provided to the LINK project

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- A distributed approach can be made to work and allows best use to be made of existing single-mode, local and regional systems and facilities, and also allows further market development
 - A distributed approach requires considerable work in developing tools to facilitate integration, ensure data quality and availability and to establish common supporting infrastructure (e.g. approaches to identifying locations uniquely)
 - A distributed approach requires careful processes for identifying, selecting and contracting with partners who are able to offer good facilities and a robust supply chain for data (in the UK this was particularly challenging for public transport journey planning)
 - Achieving significant brand recognition (to ensure the online tool is identified and used by relevant users) can take a long time in what is a busy, fast moving and competitive marketplace - especially if user demand for its unique value added proposition is relatively weak (many local, regional, national and single mode alternative information sources exist and may be less complex to use). However, it can be done. Transport Direct is now becoming a major on-line travel planning market player in the UK
 - It will be impossible to identify exactly what effect the service has on wider transport policy objectives (e.g. modal change, route choice) because access to information is only one part of the travel / transport service experienced by users, and hence their subsequent behavioural choices. However, information gathered from pop-up surveys on the website indicates the potential for a very significant impact on existing travellers travel choices including timing, route and modal change. For the 70 % of users making completely new trips, empirical information is harder to gather.

3.6. Example E: IDOS Czech Republic

3.6.1. DESCRIPTION

IDOS is the national inter-modal public transport route planning timetable information system of the Czech Republic which integrates international, national, regional and urban public transport connections including buses, rail and air. The government objective is to enable high quality public transport timetables to be freely available in a journey planning form.

The information is available on the Internet: www.idos.cz and also from third party suppliers, mainly mobile phone and phone services. IDOS.cz offers the following functionalities for travel (not necessarily even with a trip leg in the Czech Republic):

- **Selection of connection between public transport stops/interchanges from A-B (with possibility to add transfer point).** The user is allowed to choose from the following timetables) :
 - combination of bus/coach and train transport and large city urban public transport
 - bus/coach transport, train transport, air transport (separate searches)
 - urban public transport separate searches (77 cities in Czech republic)
 - integrated public transport system of Prague region (separate)
 - integrated public transport system in South bohemian region (separate)
- **Information about the connection** (journey time, distance, number of bus or train, ticket price, timestop schedule, transfer time, long-distance train wagon order, etc.)
- **Full European rail timetable integration**
- **Extensive international coach integration**
- **Real time information on Czech trains**
- **Graphical presentation of selected start/destination on the map background**
- **Contextual links into the reservation systems for purchasing / booking tickets where available**
- **Pre-reservation of services in the selected long-distance trains**

To use all the features of the IDOS Internet portal, it is necessary to have a JavaScript enabled browser.

For PDAs and stand alone PCs, the “Smartschedules” application is a free program to search for connections in the timetables of public transport. Search can be completely offline on the mobile or stand alone device. An annual license fee is charged for up to

date data – about 14 EUR per year (December 2010 - December 2011) for the Czech Republic and 12,60 EUR for Slovak Republic.

IDOS schedule can also be accessed through a mobile phone. All mobile operators in the Czech Republic support the search link in the timetable through WAP and short message service (SMS).

3.6.2. HISTORY, GOVERNANCE AND BUSINESS CASE

In the early 1990s, public transport timetables were available only in printed form. Most of the main public transport operators in the Czech republic are owned and funded by the local authorities. With the exception of a few cities, these operators do not generally have the resources to invest in ITS-based information systems. A private company, CHAPS spol. sr.o., started a private initiative in 1993 to collect and provide bus timetables electronically, taking advantage of technological developments in this area. In 1995, partnership with Czech railways (DATIS unit) added rail information to the service.

The company CHAPS spol. s r.o. (Ltd) was then authorized by the Ministry of Transport of the Czech Republic to run the CIS JR (Central Information System of timetables) as a part of the Information System of the Public Administration (ISVS) and to collect timetables of bus, railway, air, water and municipal public transport.

The government does not contribute financially, but supports the service through legislation requiring publically funded regional and national public transport operators to provide timetable information to CHAPS in a standard form, and through contractual arrangements for the service. New timetables must be made available by participating operators at least 15days in advance of the start of service ensuring a minimum level of service.

The state has provided the key input to support the service by setting up a regulatory framework. Many other PT operators (for example urban operators) without national public funding have followed voluntarily into providing information to the service, given the excellent base provided by data that is already provided obligatorily. Without the catalysing regulatory framework, the system would almost certainly not exist in Czech conditions in the quality or coverage that it does today.

The service benefits from cooperation between the state (providing service regulation and institutional support) and the private sector (managing, marketing and developing the service).

The business case for the private providers depends however on a monopoly for providing the web based JP service and fairly simple provision of web-based journey planning (i.e. PT planning stop to stop without mapping or any other modal integration) and. Although minimal public investment is financially ideal from the point of view of the state, it is not enough to support really dynamic development of map based free services and perhaps stifles innovation.

As of 2011, the exclusive Internet IDOS portal provider is the private company MAFRA, a.s. which is the web service organisation for the IDNES media group which includes an on-line version of a high circulation newspaper and other popular services.

3.6.3. EVALUATION

In February 2009 the total number of search connections was 1,378 million users (population of the Czech Republic is circa 10 million) and the total length of the visit spent was 5 minutes. IDOS users have the most interest (51 %) in searching for inter-modal options. Interest in only train connection has 19 %, in bus connection 22 % and about urban public transport connection 8% of IDOS users. Third party data sales are strong (mainly to mobile phone operators who successfully provide SMS services with circa 1 million queries per month in total, but also to a telephone service operator).

Experience of the CIS (national information system) is positive, the timetable information is (public transport) intermodal, covers all regional transport and many towns, is of high quality and is well used through a number of relatively ubiquitous media and reaches most providers of information.

The service helps the government to achieve its policy objectives, while the commercial position for CHAPS and the web service provider is stable. The income from selling data and advertising on the Internet ensures that the service is financially viable. The main source of income is from selling information to mobile phone operators.

Although IDOS is widely used, it is often the target of criticism from experts and users. In particular, the Internet version is accused of outdated cumbersome interface, excessive amounts of advertising, slow response and low technical reliability. Some of the often criticized problems should be resolved in the new version, which was provisionally released as a beta version for testing.

A frequent target of criticism is the author of IDOS, CHAPS as data are obtained free of charge, but the company sells and prevents their use in programs and services of competing third parties.

The service has its own standards (although it is integrated with international coach and train information services) and is not integrated with road information. First considerations of such options should be made within the EasyWay project in 2011/2012.

3.7. Example F: EU-Spirit¹⁴

3.7.1. DESCRIPTION

EU-Spirit is a European door-to-door travel information service that allows information from different internet-based systems to be combined to generate continuous itineraries for trips by public transport between European cities and regions. It is provided free at the point of use.

It covers all modes of public transport (long- and short-distance, including rail, air and bus) and many different operators.

It is important to note that EU-Spirit is not itself a travel planner, or even a portal – the user can enter the whole EU-Spirit system via their normal, familiar travel information system, where it is a partner in the EU-Spirit network. This means the functionality available to users (e.g. information display, maps, languages, comparisons, modal choices, route choices, ticket retailing services) depends on that provided by their preferred travel information service website. Nonetheless, in all cases identification of origin and destination is by address or public transport stop and information can be presented in an itinerary and/or map form. In addition, transfer information is provided for all interchanges.

Further development work is planned in the following areas

- integrating long-distance bus and ferry services, plus rail data for a wider area
- integrating information on tariffs for the whole itinerary
- co-modal routing, including car routing.

EU-Spirit aims to cover the whole of Europe, but its ability to do so depends on operators of national, regional and local internet-based travel information services agreeing to participate in the group, on a fee-paying basis. At present coverage includes certain regions within France, Luxembourg, Germany, Denmark, Sweden and Poland.

3.7.2. TECHNICAL ASPECTS

EU-Spirit connects existing travel information systems through open interfaces and harmonised meta information. Central technical components are used which allow the generation of complete travel information. Optimising techniques are used in order to best meet the user's information demand via their preferred travel information service website. This also means that every update to the local system is automatically available in the EU-Spirit service.

¹⁴ Much of the following information was taken from <http://www.eu-spirit.com> in March 2011.

The independent local systems are connected via central components which are needed for the generation of itineraries. These central components are:

- “RODI - Ring origin destination identifier. The RODI tries to match the user input to start and destination locations. In order to do so, the RODI contacts the appropriate passive servers”;
- “RCC - Ring connection composer. This RCC acts as a super connection composer and retrieves and combines the partial information by open interfaces to the formerly isolated information systems that now act as passive servers”
- RRDB - Ring Reference database. At this database - among others - all transition stations are stored. Transition stations are points where an interchange between two local systems or between a local system and an interregional system (e.g. national railway) is possible
- The local systems keep their user interface (GUI), algorithms and database structures and are capable to display international itineraries in their local format.

In the background all central data that are required as metadata (in order to generate itineraries) are maintained and updated. This process covers the definition or redefinition of central data. This data is stored in the RRDB and consists of:

- List of city and town names within the participating regions;
- Information about participating servers;
- Harmonised data that are necessary to meet the customer demand (e.g. selection of train categories and symbol codes);
- Transition points (nodes where different partial itineraries from the participating information systems must be connected in order to retrieve optimal itineraries).

3.7.3. GOVERNANCE AND BUSINESS CASE

EU-Spirit is the result of a European research project, which the partners decided to continue after the project's end. While membership has increased since then, at present coverage is still limited.

The EU-Spirit service providers have set up a working group for the coordination between the providers. The working group meets three times a year (and upon request) to exchange technical and scientific ideas. The technical administration is outsourced to third parties (e.g. administration of EU-Spirit is currently undertaken by VBB Verkehrsverbund Berlin-Brandenburg GmbH).

EU-Spirit is open to new providers, who can be operators of national, regional or local internet-based travel information service systems. Participation is on a fee-paying basis. This consists of a one-off connection cost (to connect the new system to the central EU-Spirit components; approx 2,500-10,000 EUR), plus an annual fee for the maintenance / development of the central components, which comprises a base fee per provider, plus a surcharge for coverage of an area over 5,000 km sq., plus a further surcharge for systems counting 30,000 or more API requests per month on the EU-Spirit service (total 9,000-18,000 EUR).

3.7.4. INTERNATIONAL FEATURES

As described above, the EU-Spirit service enables the addition of an international dimension to what is otherwise a local, regional or national travel information service.

3.7.5. EVALUATION

There is no information available on the effectiveness of EU-Spirit from the point of view of users or the partners in the network.

The continued decision of existing partners to keep paying the annual fees (which are many thousands of Euros) would imply that the service is perceived by them to deliver benefits of at least this value – either to their users or to them.

However, EU-Spirit does not appear to be rolling-out rapidly to draw within its network all of the travel information services provided by local, regional or national organisations across Europe. This might suggest that the financial, governance and/or technical models are not perceived to represent a good solution for others – or perhaps just that they have not heard of the EU-Spirit solution.

3.7.6. BEST PRACTICES AND LESSONS LEARNT

They key lessons that can be drawn from the EU-Spirit experience are:

- Just as Transport Direct, EU-Spirit proves the feasibility of a distributed approach;
- By avoiding the creation of a new website, the EU-Spirit approach does not face the problem confronting the UK Transport Direct approach – it does not need continually to compete for users with existing travel information service providers' websites. This is particularly important if user demand for international journey planning facilities is anticipated to be relatively weak;
- The EU-Spirit approach avoids the extensive costs and efforts required to collect, maintain and manage the relevant data, yet allows all partners to benefit from such investments made by other partners as soon as they are made available;

- The practical utility of the EU-Spirit approach is limited because of its limited geographic coverage, which reflects a slow rate of uptake by others across Europe – the reasons for which are unclear.

3.8. Example G: Google Transit

3.8.1. DESCRIPTION

Google Maps is a web site that provides general mapping and routing functionality, since June 2006 it also provides multimodal transport planning. Based on one single entry of origin and destination location, it can plan routes by car and public transport. The public transport routing option is called Google Transit. Google Transit integrates transit stop, route, and schedule. It is designed to integrate fare information, but we have found no example of this in Europe so far.

Google Maps is compatible with screen readers for the visually impaired. The Transit on Google Maps feature is available on selected mobile devices through Google Maps for mobile. Public transportation information is also included in Google Earth.

Currently over 500 transport operators world wide make their information available in Google Transit¹⁵. This means coverage of Google Transit is still quite sketchy. The majority of European public transport operators do not participate yet, but coverage is expanding rapidly.

Interrogated on the reason for cooperating with Google Transit, the Dutch Railways (NS) say that “NS aims to make train travel information widely available, and is especially looking to be in places where (potential) customers are planning their journey. Google Transit is such a place, and for NS particularly interesting because of Google's popular car route planner. By offering public transport information side-by-side with car route information, NS hopes to stimulate more travellers to use public transport.” (April 2011)

Interrogated on the same question, an operator of urban transport says that it “considers travel information as an essential part of the product it is offering its customers”, that it “continuously searches for ways to make travel information available to travellers” and that “through Google Transit we in particular target the foreign tourist visiting the city”.

“It believes there is a positive correlation between travel information quality and the traveller's perception of the quality of service”, but that “the effect of the cooperation will however not be noticeable because of the limited relative size of the targeted user group.”

Interrogated if initiatives such as Google Transit will lead to a market for private multimodal trip planning and travel information services, it says that “Google Transit is a

¹⁵ Here is an overview of participating PT operators: <http://www.google.com/intl/en/landing/transit/text.html#eu>. See also the illustration in the annex.

result of the existing market conditions, not the cause for the emergence of private multimodal services.” (April 2011)

3.8.2. TECHNICAL ASPECTS

Google Transit is based on the General Transit Feed Specification (GTFS), an open source format that allows transport operators to publish their stops, routes, schedules and fare scheme in a digital format. Google Transit will integrate any GTFS-feed provided by public transport operators.

Google prepared a Best Practices document, and provides a Feed Validator and Schedule Viewer. These tools allow transport operators to independently develop and test their GTFS-feed. The feed is then provided in a zip-compressed format over HTTP or HTTPS to Google. After signing an agreement with Google the transport operator can test the Google Transit routing in a private preview environment. Once launched the information in the GTFS feed can be updated by simply replacing the zip-file.

Open source tools are available that can create a basic GTFS feed from for example a spreadsheet.

3.8.3. GOVERNANCE AND BUSINESS CASE

Google has developed the General Transit Feed Specification (GTFS), an open source format created under a Creative Commons Attribution 2.5 License. This license lets third parties distribute, remix, tweak, and build upon GTFS, also commercially, as long as they credit Google for the original creation. Therefore it means that you are not constrained to make public what you build out of GTFS. This is the most accommodating of Creative Commons licenses, recommended for maximum dissemination and use of licensed materials.

The relation between the transport operators and Google is based on a closed purse approach. Google does not charge transport operators for integrating their data in Google Transit, and does not pay for the data.

For public transport operators, Google Transit provides a cost-efficient channel to make information on their services known to a wide audience, including international travellers.

Google Transit fits Google's general business model to provide services that reach a mass audience and to then generate turnover through advertising based on advanced user profiling technology.

3.8.4. INTERNATIONAL FEATURES

Google Maps is available in 12 different languages.

3.8.5. EVALUATION

Google Transit has an especially low access barrier for users, and has the potential to become a pan-European service. Transport operators and authorities are reluctant about the contractual conditions that allow them limited control on data, and about the limitations of the GTFS format that does not handle complicated cases such as split rail services, stop areas, guaranteed connections etc.

4. Technical aspects

4.1. System architectures for interconnected journey planning

The problem of building an interconnected journey planner based on data sets supplied by different bodies has a spectrum of solutions in terms of system architecture, ranging from centralised to distributed. Three main types of architecture are described in the following:

- Centralized (regional MMJP, some national MMJP service)
- Decentralized with a central DB and application (ex. EU Spirit)
- Fully decentralized (ex : DELFI).

Further system architectures can be imagined beyond these three types. For example, an approach trialled in Austria consists in keeping the regional databases and the associated responsibility of data management decentralised, while generating mirror copies of each regional database in the other regions so that the itinerary calculation can be performed locally.

Neither of these system architectures is superior in absolute terms. For a given project, the best choice must consider the whole set of technical requirements, the characteristics of the networks to be interconnected, and the organisational framework.

Some key points:

- Centralised itinerary calculation is generally faster. Data management gets more demanding with larger volumes of data.
- In decentralised architectures, the responsibility for data quality assurance and the control on the use of the data is with each data supplier.
- Any decentralised approach needs a central management of common references to interconnection points.
- The above architectures have generally been developed for journey planning without real-time data. Integration of real-time data will be a challenge for all types of architectures.

4.1.1. FULLY DECENTRALIZED

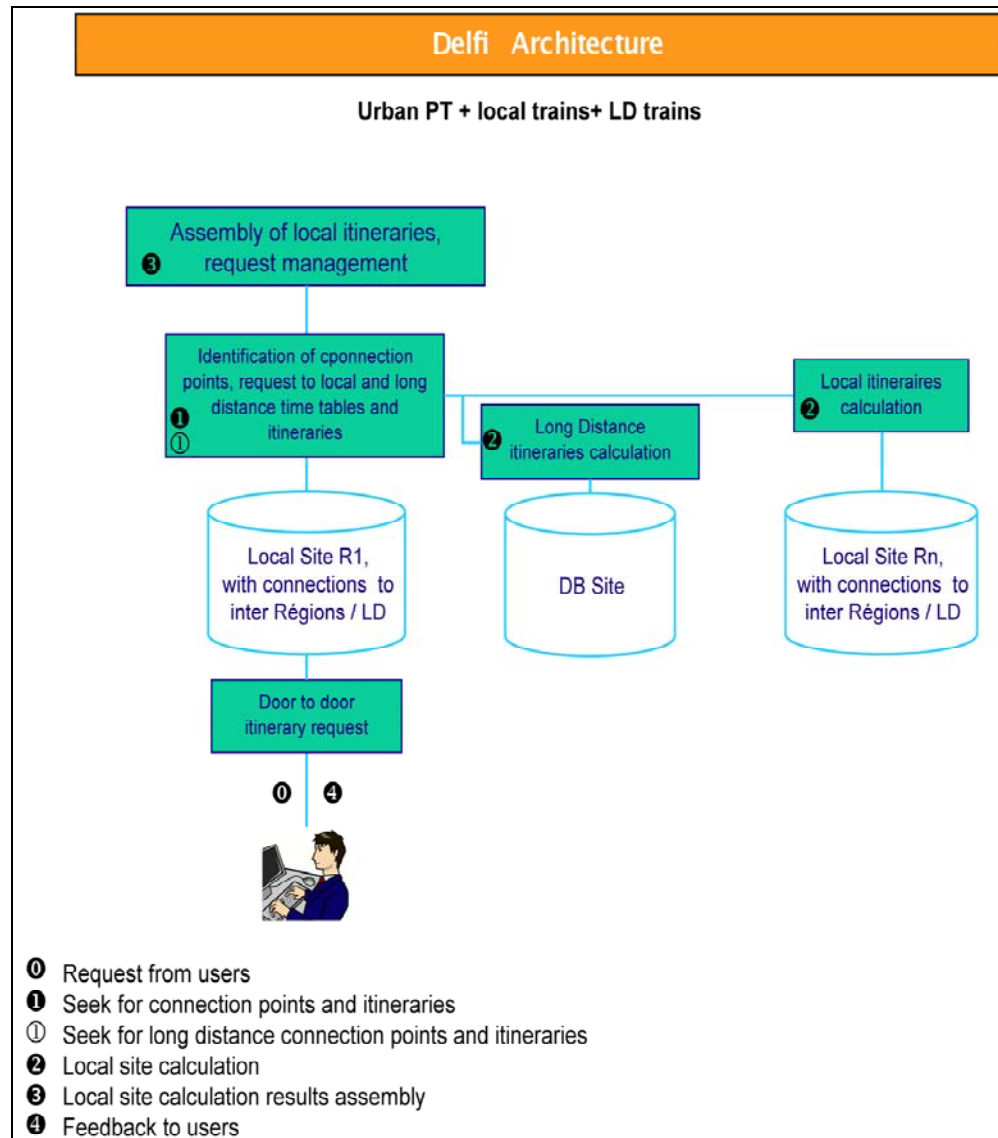


Figure 3 : Example of fully decentralised architecture

This architecture is exemplified by the DELFI system in Germany, which assembles regional sites that were already created but that do not have the long distance timetables. It constructs the overall journey by sending multiple elementary requests to each of the interconnected journey planners. A long-distance itinerary will typically be the concatenation of two local itineraries with a long-distance leg, but the range of possible solution is not constrained to that structure.

4.1.2. DECENTRALIZED WITH A CENTRAL DATABASE

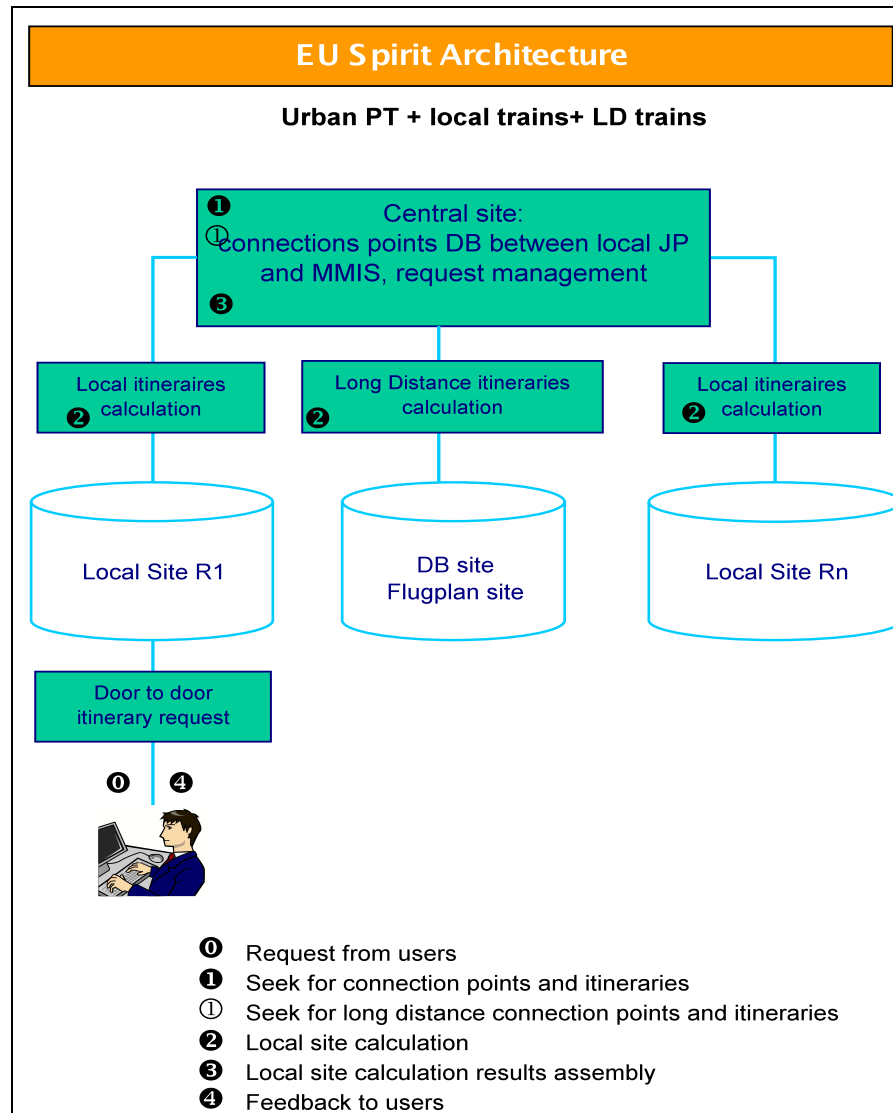


Figure 4 : Example of decentralised architecture with central database and application

This architecture is exemplified by EU-Spirit. It decomposes the overall origin-destination request on the basis of a voluntarily limited number of pre-defined transition points between the interconnected journey planners, using a central database. This allows the main algorithm to send a single set of requests to each of the interconnected journey planners, and to construct the overall journey on the combination of the respective sets of response.

4.1.3. FULLY CENTRALIZED ARCHITECTURE

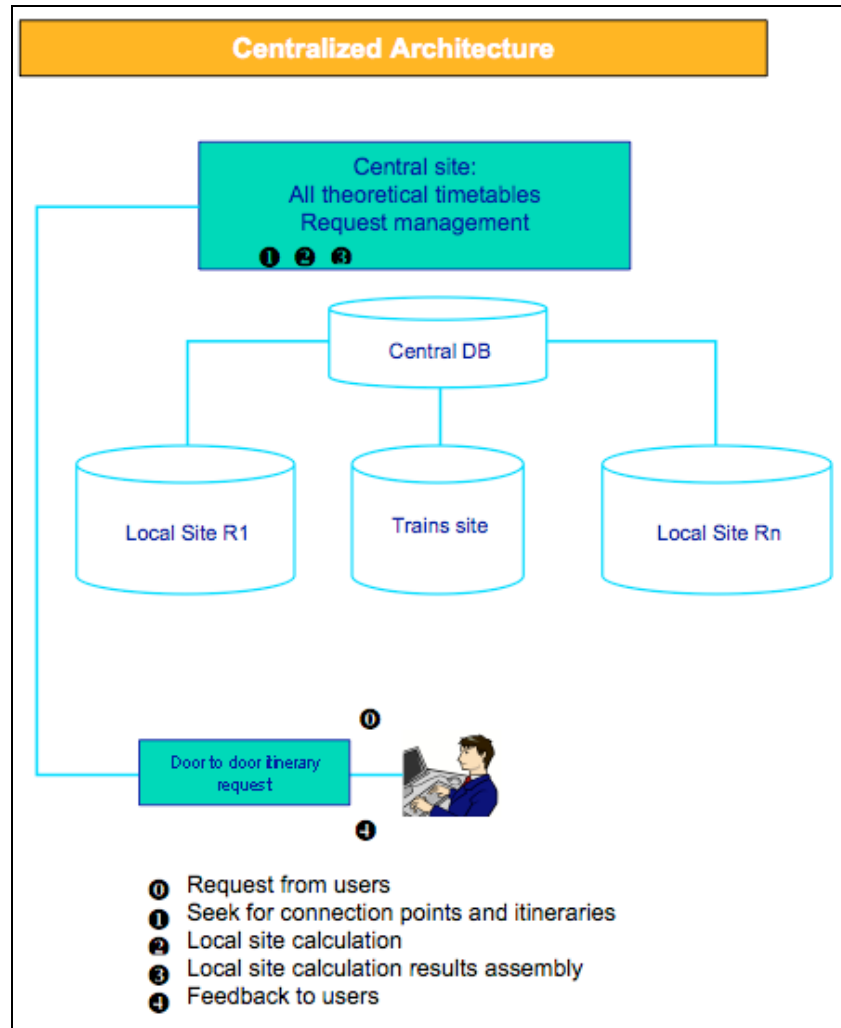


Figure 5 : Illustration of centralised architecture

This architecture aggregates multiple data sources in a central database, and performs the itinerary calculation locally.

4.2. System architectures for delivery to end users

The question of delivering journey planning to end users through different channels opens a second dimension of system architecture. A lot of different delivery channels are used at present. The following diagram illustrates that these can be of different types. The text refers to web delivery, but the concepts can be extended to any other interactive media.

We take the point of view of a journey planner possessing its own database. It can be part of distributed architecture or not. Its perimeter in the diagram is marked by the dotted line.

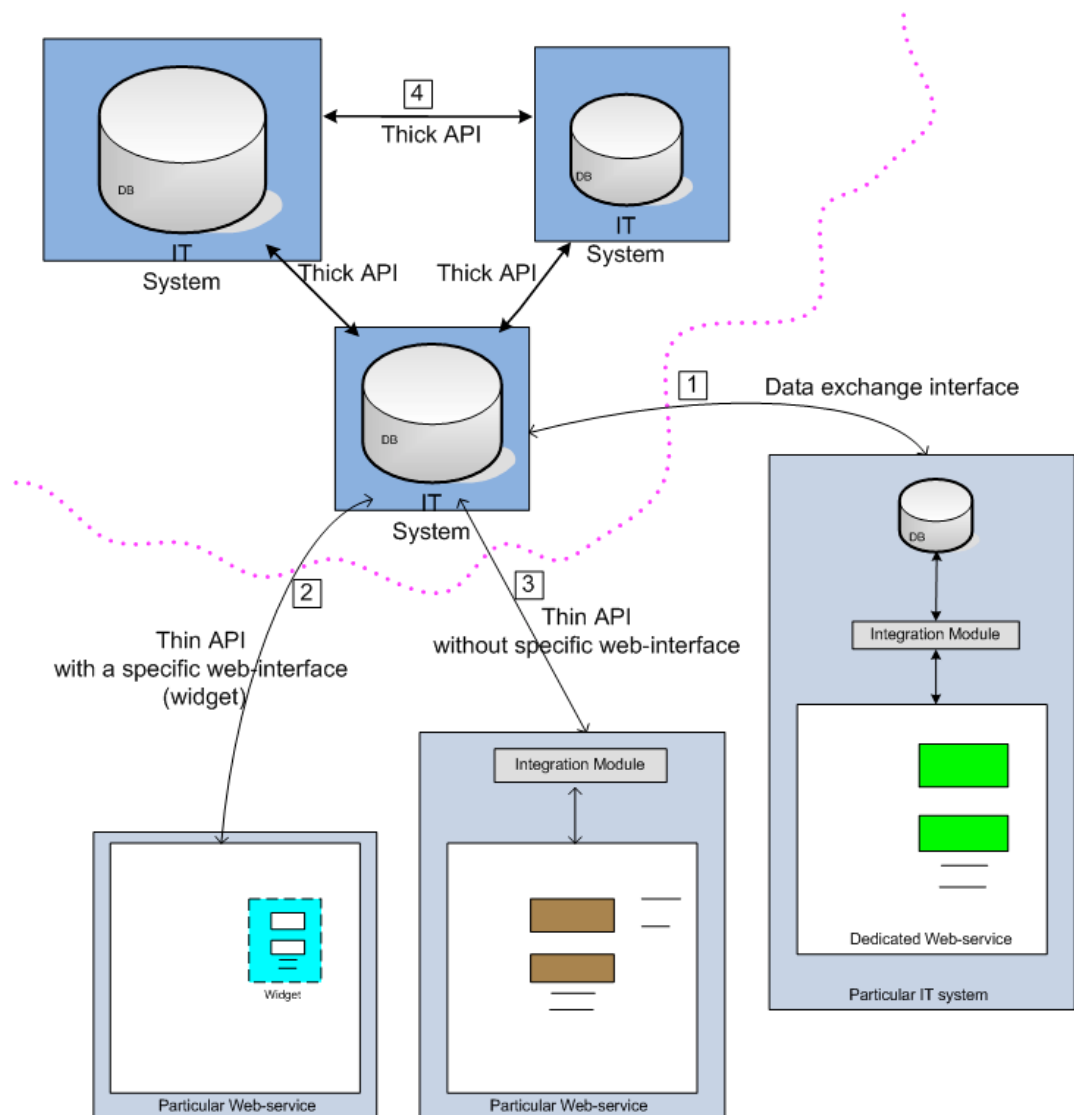


Figure 6: Different types of journey planning delivery.

In the diagram, the term “Thick API” between the IT systems that compose the journey planner refers either to interfaces for distributed itinerary calculations (see §6.4), or to any other non-standardised interfaces. At present, several countries use national standards.

The term “Thin API” refers to an interface that allows to deliver journey planning on a third-party website without the need of local data storage on the third-party website.

- A thin API with a specific web interface is based on a widget (a re-usable graphic user interface) offered by the journey planning provider and directly integrated into the third-party website (number 2 in Figure 6). This type of interface is suitable for a website that is not dedicated to transport, because it is easy to implement for the third-party webmaster, and recognisable for the end user. For example, Transport Direct offers widgets that are used by medical service websites.
- A thin API without the specific web interface (number 3 in Figure 6) refers to a situation where the third-party website presents the journey planning information in its own way, related to other information contents (leisure, ...). This requires a larger effort for implementation by the third-party website. This type of service delivery is not common in multimodal journey planning today¹⁶. A comparable example is a meta search engine for air travel that aggregates multiple solutions from different airline websites.

The term “Data exchange interface” (number 1 in Figure 6) refers to the situation where the third-party website has a local data storage, using standardised data exchange protocols (see §6.3), such as TransXChange in the UK, Neptune (formerly Trident/Chouette) in France, or VDV in Germany, or other non-standardised interfaces. Another example of this situation is Google Transit, the data exchange format being GTFS (see §3.8). The distinction between a distributed architecture and a simple service delivery channel gets blurred in this situation. The data exchange protocol can be either a standardised one or not. Also, it should be mentioned that there is free software for developing journey planners, for example Graphserver used in the open-source multimodal journey planner Opentripplanner¹⁷,

¹⁶ routerank.ch is a probable example

¹⁷ Opentripplanner is compatible with GTFS but not yet with the upcoming European standards (NeTEx).

4.3. Verification of conformity to defined data formats

To a certain extent, data quality in multimodal journey planning can be ensured through technical verification of conformity to defined data formats.

The flow of data of a basic system can be represented as a chain of consecutive operations, as an Easyway Expert Group¹⁸ defines:

- Raw data (basic data acquisition)
- Data validation and integration
- Information production (processing phase)
- Service generation (insertion of data in a service system)
- Service delivery (dissemination)
- Consumption (by users)

The content of each operation differs from one information system to another, and depends on his place in the overall architecture. In particular, the terms “raw data” and “consumption by users” will take different meanings from one system to another.

This said, the critical question for a given system is whether data supplied by other systems is conformal to defined rules. As an answer to this, tools for verifying conformity to defined formats have been developed in different contexts. Examples are the French tools BATERI (www.bateri.fr), or Google's validation tools (see §3.8). With the existence of such tools, the responsibility for ensuring the conformity to the required formats can be shifted from the receiver to the emitter of the data set.¹⁹

In a wider perspective of interconnected systems for journey planning, one should keep in mind that the quality of each operation determines the final quality. Therefore there is a vertical dimension (bottom-up vision), as well as a horizontal dimension (shared vision), where data quality should be maintained. Current data validation tools address primarily the vertical dimension.

¹⁸ Source : « The Data Quality Aspect in ITS - Framework and Best Practices » , v0.5, EASYWAY Project - ICT Expert Group

¹⁹ In particular, Google Transit allocates the responsibility for data creation, validation (by using the validation tools) and integration (by placing the zip-file on the server) to the data supplier, who thereby accepts a significant internal cost.

5. Governance and business case

5.1. Existing JP governance schemes

In the present context, governance means how the different organisations involved in multimodal journey planning cooperate for providing a multimodal journey planner. A variety of cases have been described in chapter 4.

5.1.1. THREE CASES OF INTERCONNECTED JOURNEY PLANNERS

The figure below presents a comparison for three different cases of interconnected journey planners.

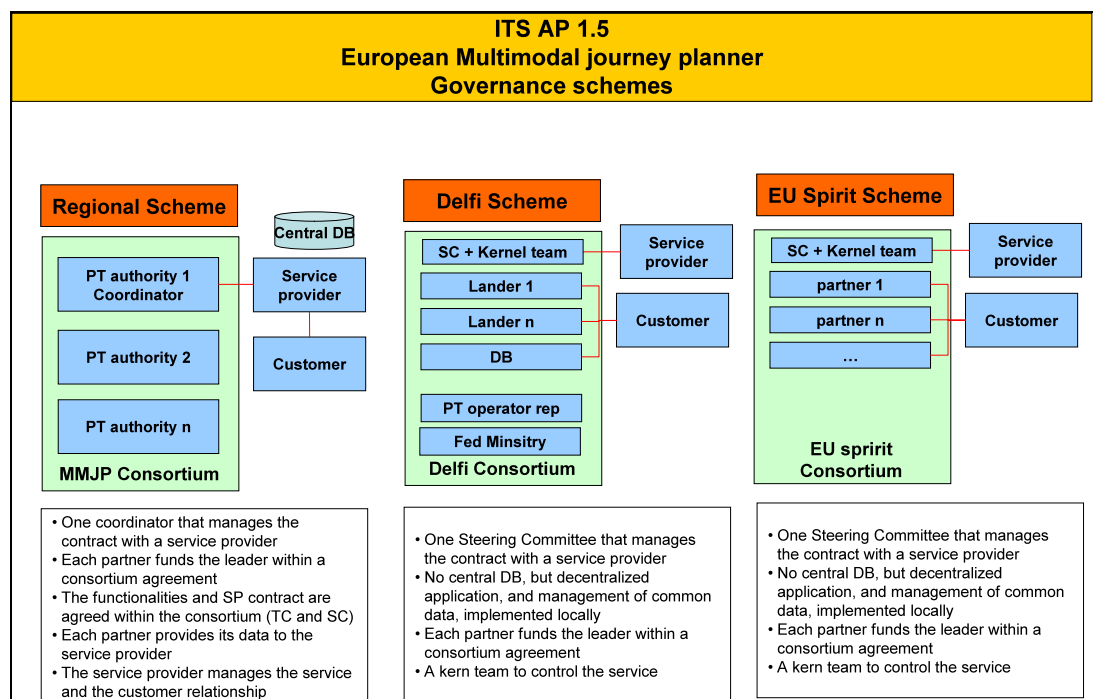


Figure 7 : Examples of governance schemes for different cases of interconnected journey planning.

5.1.2. TYPES OF AGREEMENTS

Existing governance schemes are founded on agreements. We may distinguish different types as follows. In practice, these types are mixed, and a given party may at the same time be a leading actor and a data supplier (e.g. in EU-Spirit).

- **Cooperation agreements:** They are made between leading actors, which means an authority that is in charge of travel information, or a company that operates a journey planning service in its own name. The latter are generally transport operators. By a cooperation agreement, **two or several leading actors** agree on a peer-to-peer basis to cooperate for the provision of a common JP service. The cooperation agreement typically defines the organisational bodies and the financing rules that govern the cooperation. The precise name of the agreement will vary with the nature of the parties involved (consortium agreement, convention, ...).
- **Data interchange agreements:** By this type of agreement, a **data supplier** agrees to provide a data feed to a **JP provider**. The symmetrical term “data interchange” is generally preferred even if the data feed is unidirectional.
- **Service agreements:** By this type of agreement, a **contractor** agrees to perform tasks for the operation of a JP service on behalf of a leading actor, or group of leading actors.

In addition to agreements, there are **regulations**.

- There are regulations that create the obligation of providing a travel information service, thus instituting a principal. For example, French regions are concerned by such regulation.
- There are regulations that create the obligation of providing data for a travel information service. For example, the Czech IDOS service is built on such regulation.

5.2. Existing JP business cases

A business case is generally understood as the accepted justification for financing of an investment or service, which may be multi-stakeholder and includes monetary and social benefits/incomes.

By business case, in the present context, we mean the terms that enable a JP provider to finance the costs of producing its journey planning service.

The difficulty of the concept is, in the context of multimodal journey planning, that none of the actors makes a living from selling multimodal journey planning information at a higher price than it buys the data for producing it. The end user is not willing to pay, in the standard case of a web service, hence there is **no self-contained value chain** of multimodal journey planning.

5.2.1. THE ECONOMY OF JP PROVIDERS

A first entry point consists in looking at each economic entity involved, i.e. at a given company or authority. Each JP provider has to equilibrate spending and revenue in order to be sustainable.

The difficulty of this view is to delimit the costs of JP provision within a transport operator's overall production cost, or more generally within any organisation that is not dedicated exclusively to the purpose of journey planning.

Main types of business cases are:

- Journey planning service is a part of the **transport service**. The user feels that he or she pays for the service through the ticket price. This is the typical situation where transport operators act as journey planning providers.
 - o Example: ratp.fr
- Journey planning service is a part of **public policy**. The user pays through his or her taxes. This is the typical situation of a public authority acting as journey planning provider, or funding it, because they assume there is a socio-economic business case.
 - o Example: transport-idf.com, vialsace.eu
- A **media** business model: Journey planning is content that attracts audience for advertising.
 - o Example: Google Transit.
- Other types of **bundling** than with the transport ticket: one can imagine that bundled service offers associated to mobile devices, to telecom subscriptions (see IDOS case 3.6), to payment means, ... will in the future contain multimodal journey planning services. For car navigation, this is the dominant business model at present.

5.2.2. ECONOMIC TERMS OF DATA INTERCHANGE

A second entry point is to look at the economic terms (price and conditions) of data interchange agreements between different parties.

For example, it happens that authorities pay a periodical fee to the transport operators for obtaining the feed of data for their journey planners. A quite different example could be drawn from road traffic message channel (TMC), where private service providers pay a fee to public authorities for using the TMC location reference tables in their systems, for example in Austria.

The difficulty of this view is that in the absence of a self-contained value chain for multimodal travel information, the economic terms of data interchange vary greatly from

one case to another. They do not effectively determine the market structure in multimodal journey planning. It is quite the contrary: the terms of data interchange are determined by the nature of the involved parties. In practice, data interchange exists only where the business models of the involved parties are deemed compatible by both sides.

5.3. Stakeholder imperatives

While some imperatives are natural to journey planning provider, such as having reliable and accurate data sources and reducing costs through standardised formats, other imperatives vary in relative importance with the different types of business cases sketched above, and induce different priorities in the definition of the product “ multimodal journey planning”.

Very schematically:

- For transport operators, multimodal journey planning has to take into account the **commercial interest** of the operator: while remaining objective, the information may be selected and presented with a certain bias in order to attract customers to the operator's own network.
- A further imperative for transport operators is the **management of crisis situations**. As soon as an unplanned disruption takes place, the priority is to control the travellers' behaviour in order to ease the crisis situation. While remaining objective, the information has to be delivered with authority and responsibility.
- For these and more reasons, transport operators search a certain degree of **control on intermediaries** who deliver journey planning on their networks, or to avoid intermediaries, in particular when it comes to real-time information.
- **For public authorities, impartiality and completeness of territorial coverage** are usually basic requirements for a multimodal journey planning service paid with public money. Hence, lack of data availability is particularly difficult to accept.
- Public authorities often use multimodal journey planning in order to **serve modal shift**. Again, this may lead to a certain bias in the selection and presentation of the information. For example, how to display a comparison of travel times where it is favourable to the private car, or how to include Park&Ride journeys where Park&Ride competes with local bus services?
- The media business case searches **maximum audience**: priority in coverage of multimodal journey planning will tend to be where travellers numbers are largest and where demand is massive, in particular to exceptional situations where real-time data is relevant.

6. Review of standards

6.1. Introduction

According to CEN (European Committee for Standardization) definition, “a standard is a technical document designed to be used as a rule, guideline or definition. It is a consensus-built, repeatable way of doing something. Standards are created by bringing together all interested parties such as manufacturers, consumers and regulators of a particular material, product, process or service. All parties benefit from standardization through increased product safety and quality as well as lower transaction costs and prices. A European Standard (EN) automatically becomes a national standard in the 31 member countries.”

It is evident that standardisation must be addressed in the framework of the ITS Action Plan.

Existing standards in multimodal information can be seen as a pyramid as illustrated below.

- **Data models** organise the information into data items and relations between them. Using common data models is the basis for ensuring that data can be used by different systems in the same way (§6.2).
- **Data exchange interfaces** define formats and protocols (§6.3).

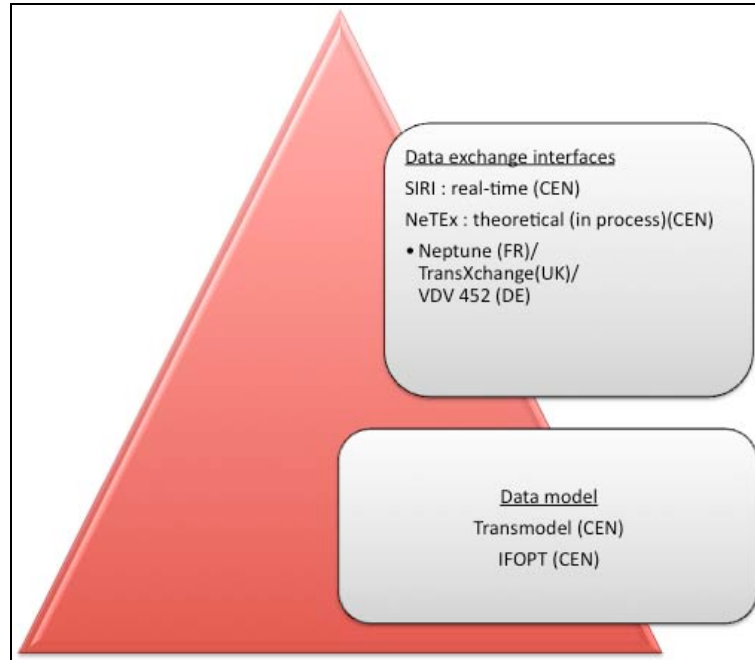


Figure 8: Standards in a pyramid (see text)

On top of these types and besides them, the present chapter addresses:

- Standards for distributed journey planning (§6.4)
- Standards for data quality (§6.6).

Furthermore, TAP-TSI is relevant in this context (see §6.5).

6.2. Standardised data models

6.2.1. TRANSMODEL

Transmodel 5.1 (EN12896) is a reference standard which provides a conceptual data model for use in information systems for public transport.

Transmodel is a high-level model. It includes a dictionary of general semantics. It avoids any redundancy and describes concepts regardless of the context or the users. It provides a framework for defining and agreeing the logical data structures.

It covers all modes of public transport operations.

Transmodel is recognized and has served as a basis for all later standard developments.

Lacks of Transmodel are²⁰ :

- **metadata** (data management (accuracy, currency, ownership and permissions) and protection),
- **long distance and multimodal journeys** (it is based on city travel; aspects such as check-in time, seat reservation or travel preferences (aisle/window seat, dietary needs,...) are not covered),
- **fare and tickets** (passenger information and fare collection are split into separate areas),
- **journey add-ons** (it does not make provision for specific common add-ons journey (such as meals or newspaper).

6.2.2. IFOPT

IFOPT (CEN/TS 00278207)²¹ is a CEN Technical Standard defining a data model for the Identification of Fixed Objects in Public Transport (e.g. stop points, stop areas, stations, connection links, entrances, etc.).

IFOPT enables unique identification of the stops. It is an answer for dealing with ambiguous identification, inaccurate description, and imprecise location in space of Public Transport stops. It aims at eliminating the need for developing and maintaining correspondence tables.

IFOPT builds on Transmodel to define four related sub models, as described below:

²⁰ Source : CEN TC278/WG3 EN 12896:2006 - Road transport and traffic telematics - Public transport - Reference data model

²¹ Source : CEN TC278/WG3 TS 00278207 - Road traffic and transport telematics - Public transport - Identification of fixed objects in public transport

Fixed Object Submodels

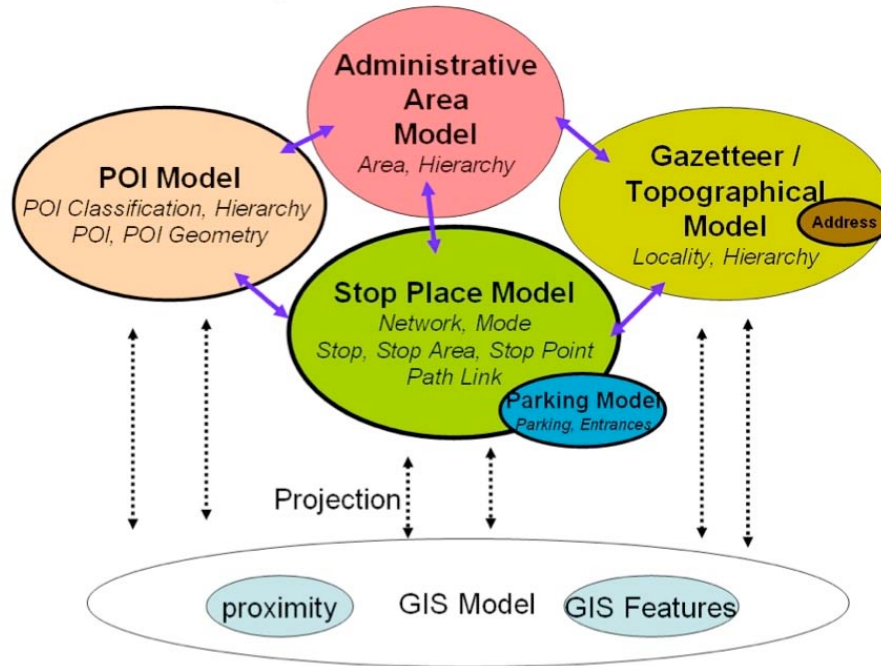


Figure 9 Sub-models included in IFOPT [CEN/TS 00278207]

Among the above four sub-models, only the Stop Place Model is the mandatory one. The other models are subsidiary and may be implemented on an optional basis.

The Administrative sub-model of IFOPT provides an organisational model for assigning responsibility to create and maintain data in a collaborative process involving different stakeholders.

Geospatial locations referencing PT objects or map representation are outside the scope of IFOPT. GDF (Geographic Data Files) is the standard used for this purpose.

The Stop Place Model includes the Stop identification enabling the definition of systematic and unique identification of stops by both humans and computers. The recommended structure of the unique identifier for a Stop Place Component within a Stop Place is :

- *Country Code + Administrative Area Identifier + Stop Place Identifier + Stop Place Component Identifier*
- The Country code referred to the IANA code : fr, de, uk,...
- The other levels must be chosen on a national/regional basis.

IFOPT is a reference data model. This means that for each information system (National, regional), a data model, compliant with IFOPT, should be elaborated. In the UK, this data model is represented by the two national standards, NaPTAN (National Public Transport Access Nodes) for recording the location and details of PT access nodes including bus stops, airports, rail & coach stations, ferry terminals, tram stops; and NPTG (National Public Transport Gazetteer) for recording location, names and relationships. IFOPT has initially been created from the NaPTAN data model. Currently it is NaPTAN that will be adapted to be entirely compliant with IFOPT.

6.2.3. OBSERVATIONS

The identification of fixed objects needs to be managed at a national level and the standard has to take into account the respective national organisational models for administering data, as exemplified by the UK. Because of the large number of stops and their geographical dispersal, this will typically involve a distributed process with a number of parties needing to be coordinated.

Once that the identification is unique at national level, the international uniqueness is ensured by the country code.

Transmodel is now widely recognized and has served as a basis for all later standard developments. IFOPT is as well more and more recognized and used by involved stakeholders.

6.3. Data interchange standards

6.3.1. SIRI

SIRI (CEN/TS 00278181-1 to 5)²² (Service Interface for Real-Time Information relating to public transport operations) is a European CEN technical standard for the exchange of real time information. It has been developed on the basis of national and international projects (Trident, VDV, AVMS, RTIG, TPEG).

SIRI comprises a general protocol for communication, supporting both direct request/response and publish/subscribe patterns of interaction, as well as a modular set of functional services as follows :

- Exchanges:
 - o planned timetables,
 - o real-time updates to timetables,
 - o general information messages between participants.
- Provides timetable and real time information about:
 - o stop departures and arrivals,
 - o feeder and distributor arrivals and departures at a connection point.
- Provides real time information about:
 - o incidents,
 - o facilities,
 - o vehicle movements.

The main purpose of SIRI is to update a journey planner database with real time information from a data supplier.

6.3.2. NETEX

²² Source : CEN TC278/WG3 TS 00278181 - Road traffic and transport telematics - Public transport - Service interface for real-time information relating to public transport operations – Part 1 to 5

NeTEx is a prCEN/ Technical Standard currently in development. It intends to provide an efficient European wide physical data model and XML standard for exchanging PT (covering long-distance train, bus, metro, tramway, trolleybus, ferry, coach, plane) reference data, such as schedules and related data.

It is based on Transmodel, extended with additional concepts from IFOPT and SIRI, and taking account of existing national formats such as TransXChange (UK), VDV 452 (DE) or Neptune (FR).

It is composed of three parts:

- **Part 1:** Public transport Network Topology exchange format (almost done)
- **Part 2:** Scheduled Timetables exchange format (in progress)
- **Part 3:** Fare information exchange format (including different tariff structures (spatial, time based, yield managed) (to be done 2012)

Work of Part 3 has started on the description of interoperable fare information exchange for public transport data (incl. heavy rail).

NeTEx takes into account the requirements formulated by ERA (European Rail Agency) – TAP/TSI (Telematics Applications for Passenger Services/ Technical Specification for Interoperability) and the UIC directives. However it excludes the management of fare products and applications (purchasing and fulfilment).

NeTEx uses a fully articulated model that is designed for the efficient, updateable exchange of complex transport data between interconnected systems. Therefore it will be essential to be used by all stakeholders for all technical architecture that is applied.

6.3.3. TPEG

TPEG-PTI²³ is an ISO standard providing a protocol for the description of real-time information on Public Transport. As with all TPEG message protocols, TPEG-PTI encodes information in a language and map independent format. TPEG-PTI messages can be coded in XML-messages (TPEG-ptiML) or in a data stream of compressed messages (TPEG-PTI).

TPEG-PTI intends to cover all modes of public (ie collective) transport as well as inter-urban and intra-urban travel. TPEG-PTI was part of TPEG Generation 1 toolkit containing also the TPEG Location Referencing system.

It is for example used in the UK, coding incident messages that the BBC interprets in its travel news (it also appears in the Live travel section of Transport Direct).

²³ Source : ISO/TS 18234-5 :2006, Traffic and Travel Information (TTI) - TTI via Transport Protocol Expert Group (TPEG) data-streams - Part 5: Public Transport Information (PTI) application.

SIRI has thereafter taken into account TPEG-PTI for identification and classification of real-time situations, however SIRI is based on TRANSMODEL and IFOPT for the location model elements.

6.4. Standards for distributed journey planning

A series of proprietary or national formats are currently in use for distributed journey planners. Examples :

- JourneyWeb (TransportDirect) is an XML protocol (UK national *de facto* standard) allowing distributed journey planning engines to communicate in order to provide multimodal journeys spanning different regions.
- The project DELFI has developed a shared data model and an information system **interaction XML protocol**.
- The project EU-Spirit has led to the development of an XML protocol, used to exchange elaborated information between journey planners.

These three protocols use XML and share large commonality in the way they deal with questions and answers between other systems. Merging these protocols was the subject of debate in the CEN/TC278/WG3/SG8, entitled DJPS (Distributed Journey Planner System), which aimed to create a European unique standard for this particular interface protocol. Works have been stopped for lack of sponsorship.

6.5. TAP-TSI

TAP-TSI is a European rail telematics interoperability standard for rail passenger telematics applications as required by directive 2001/16 on interoperability and to be in line with the prepared (rail) passenger rights regulation 1371/2007. This standard has been published on 12th May 2011 as EC 454/2011²⁴. It will lead to mandatory, fully interoperable rail information services across Europe.

It defines, among other items, basic standard requirements on content, quality and common referential databases and is defined to enable smooth interoperable exchange of passenger information for rail transport. Part of the standard is a definition of a standard rail data exchange architecture and definitions of key data content and but also approved standards of exchange with other modes.

²⁴ see http://ec.europa.eu/transport/rail/interoperability/interoperability/telematic_applications_en.htm

As rail transport is the backbone of long-distance terrestrial international travel, the TAP-TSI standard is of some importance for the further development of any European intermodal journey planner.

Timetable data content

Standard information content on timetables, (aside from departure and arrival time) is defined as :

- Basic principles of train variants
- Representation of a train,
- Different possibilities to represent days of operation,
- Train category / Service mode.
- Transport service relationships
- Coach groups attached to trains,
- Joining to, splitting from,
- Through connections (connecting to),
- Through connections (Service number change).
- Details of transport services
- Stops with traffic restrictions,
- Overnight trains,
- Time zone crossings,
- Pricing regime and Reservation details,
- Information Provider,
- Reservation Provider,
- Service Facilities,
- Accessibility of the train (including scheduled existence of priority seats, wheelchair spaces, universal sleeping compartments)
- Service extras,
- Connecting - Timing between transport services.
- Station list.

This is a reflection of the complexity of rail travel.

Timetable data quality and availability requirements

- Timetable data should be made available to all railway undertakings, to third parties²⁵ and to public bodies.
- For those transport services for which the rail undertaking (RU) has sole control, the annual Timetable should be made available at least two months before that Timetable comes into force. For the remaining transport services the RU should make available the timetable as soon as possible.
- The RU should make available any change to the annual Timetable in a series of Timetable updates at least seven days before those changes take effect. This obligation shall apply only when the change is known to the RU seven or more days in advance of it taking effect.

²⁵ Third party is defined in the glossary of Regulation 454/2007 as follows : « Means any public or private undertaking, which is not a railway undertaking or infrastructure manager and provides services ancillary to, or in connection with, the services/transport services ».

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- For data quality assurance purposes, the originator of any TSI message will be responsible for the correctness of the data content of the message. Where the source data for data quality assurance purposes is not provided from the databases provided as part of this TSI, the originator of the message must make the data quality assurance check from their own resources. To this end quality indicator will be used based on appropriate percentage for quality of data completeness, consistency, timeliness and accuracy.

Tariff Data

Standard (distance based), integrated reservation ticket and special tariff data is defined for different types of journey, however it will be made freely available only to third parties that are authorised to sell, authorised public bodies and other railway undertakings. As it stands, this will make it very difficult to provide tariff data within a multi-modal European journey planner, particularly as tariffs for long-distance international rail are very complex.

Proposed connecting standards to other modes

Standards for providing information to connect with other (public transport) modes are defined as TRANSMODEL (basic widely used public transport data model for JPs, used for example in the UK), IFOPT (new more detailed standard of description of fixed objects in public transport for JPs), and SIRI (new real-time JP information standard in public transport).

6.6. Data quality

There is no specific standard addressing data quality management for journey planners. In general, leading operators have improved their quality management over the years.

DG Mobility and Transport has supported the project QUANTIS in the field of road traffic data management. The aim of this project was to investigate the relationship between ITS service quality and benefits/costs, determine the optimum service quality in four European service cases, identify levels of data quality providing optimal service quality and to give a recommendation for European guidelines for quality assurance of traffic data.

An Easyway ICT Expert Group has been created, taking QUANTIS findings into account, whose aim is to compile and disseminate best practices in the domain of data quality monitoring.

7. Stakeholders views

7.1. Stakeholder Consultation

An on-line survey has been conducted under the direct responsibility of DG Mobility and Transport during the present study. The survey's objective was to collect information and opinions from stakeholders across the EU on the vision, feasibility and possible technical/organisational implementation issues of European and national multi-modal journey planners. The survey should also provide a first input to the elaboration of the specifications for multi-modal travel information foreseen under the ITS Directive.

The survey was targeted to specialists from national, regional and local authorities, public and private service providers, public transport operators and other stakeholders with a focus on on travel information for any mode of transport.

The questionnaire was defined by DG Mobility and Transport, the study team provided comments on the draft version. The questionnaire was implemented through the Commission's standard online survey tool ("interactive policy-making tool"). It was on-line from 1st April to 27th May 2011 on the Commission's website.

The link to the consultation was distributed by DG Mobility and Transport through existing mailing lists that comprise identified stakeholder organisations. The recipients were invited to distribute the link further.

The responses have been transmitted to the study team for subsequent analysis.

The outcome of the survey has been presented and discussed at the stakeholder workshop. The detailed report of the survey analysis is included in deliverable D4 of the present study, which is published on the Commission Website²⁶.

7.2. Stakeholder Workshop

The workshop "Towards a European Multimodal Journey Planner" has taken place in Brussels on the 20th of June 2011 with 74 participants.

The workshop minutes, the invited speaker's presentations and the attendance list are included in deliverable D4 of the present study, which is published on the Commission's Website (cf; footnote 26).

²⁶ http://ec.europa.eu/transport/its/consultations/2011_05_27_multimodal_journey_planner_en.htm

7.3. Synthesis

The on-line survey has shown a strong response, and the workshop has confirmed the high interest of the stakeholders through their high attendance and their lively and qualified participation to the discussions.

The stakeholder feedback is qualified, and has allowed the study team to refine the recommendations of the study. Indeed, it has to be borne in mind that the stakeholder feedback was collected on the basis of intermediate results of the ongoing study.

The stakeholders are quite consensual on the fact that an MMJP and an EMMJP are strong tools for promoting a modal shift.

Stakeholders are consensual in considering rail and terrestrial public transport as central pillars of a European multi-modal journey planner, while road, air and ferries appear as further important modes.

The stakeholders are quite consensual with the stepwise approach of DG Mobility and Transport: multimodal journey planning first, multimodal booking later.

The main issue that was underlined by all stakeholders is the reliability of data throughout the process of data provision. Reliability is a primary need of the end users, hence every JP provider has a constant need to know the reliability of its data sources.

The stakeholders consensually find that while expectations of users are high (due to technical progress), the organisational issues are more challenging.

They consensually consider that the role of the European Commission should be an active one especially when it comes to establishing a legal framework and promoting standardisation.

Stakeholders express a quite consensual preference for distributed solutions, because these correspond better to existing organisational structures, facilitate adequate allocation of responsibility for data quality, and accommodate issues related to data ownership. There is awareness of the organisational and technical limits of distributed solutions, especially concerning real-time data.

No consensus appears concerning the business models. While some stakeholders see a priority in constructing a solid business model for a publicly controlled reference service on national levels with a European layer on top of it, others see the priority in creating a European market for traveller information data.

The relative importance of multi-modal booking, with respect to multi-modal journey planning, also shows different views.

A point of divergence among stakeholders lies in the appropriate means for reaching open data access. The principle of open data access is supported by most, although in various scope (e.g. should it extend to real-time information or not) and depending on the conditions. The use of legislative instruments for opening data access is claimed by some and opposed by others.

Arguments in favour of using legislative instruments:

- It guarantees that existing data are effectively available.
- It provides security for investments in new services and market development.
- It creates equal opportunities and fosters third party business esp. SMEs.

Arguments against using legislative instruments:

- The effort and time needed for the legislative process is not proportional to the benefits, as long as alternative means for ensuring data access are available.
- It puts new burden on transport operators that have to provide data.
- The operators' incentive for adding value to data is lost when the resulting data are mandatorily shared with competitors.

8. Conclusions and Recommendations

8.1. Vision and issues

8.1.1. OBSERVATIONS ON PREVIOUS CHAPTERS

Ch. 2 reviewed various recent and broadly supported projects that have analysed user needs and functionalities of a European journey planner. We observe that there is no definitive prioritisation or common hierarchy of functional user needs – there are many aspects, and the hierarchy of functions depends on the scope under consideration.

Ch. 3 describes examples of multimodal journey planners on regional, national and international level. We refrain from general conclusions of what is a success and what is not – we consider that each example proves by its existence that the rationale behind it is relevant.

Ch. 4 addresses technical issues and their organisational impacts and restrictions. Indeed, the analysis of system architecture systematically leads to the analysis of the organisation behind the journey planner. One might say that each journey planner gives rise to its own variant in system architecture.

Ch. 5 reviews governance schemes and business models. We observe that there is no self-contained value chain of multimodal journey planning in general; where a self-contained value chain has been constructed through some stabilising and risk/cost sharing public intervention, its extension is limited by the limits of that intervention. In general, different business models co-exist, and each one has the potential of disturbing and destabilising the others.

Ch. 6 reviews the standards. We observe that the existing standards provide for rich data interchanges enabling EU-wide multimodal journey planning with a high level of service. Further improvement and extension is possible but not indispensable for reaping the benefits of existing standardisation. The most widely accepted official standards - Transmodel, IFOPT, SIRI, NeTEx – result from a process of convergence of different ancestor standards. We observe that the accepted standards are non-prescriptive in terms of system architecture. TAP-TSI is an essential context element because it defines the standard information content on rail timetables that shall be made available on a regulatory basis. It translates to the relevant standards for other modes, aiming at a convergence between long-distance and urban travel information. We observe that the TAP-TSI regulation introduces a strong delimitation of scope: information on rail timetables shall be available to all, while tariff information is reserved to railway undertakings and authorised third parties and public bodies only, and real-time information is not addressed.

8.1.2. STAKEHOLDER FEEDBACK ON SCOPE

The stakeholder consultation has shown a good consensus on the fact that rail and terrestrial public transport are seen as central pillars of a European multi-modal journey planner, while road, air and ferries appear as further important modes.

However, the stakeholder feedback also confirms that for each type of stakeholder, multimodal journey planning is naturally related to a set of various topics. For transport operators, typically, it is related to ticketing and to traffic management. For public authorities, depending on their mission, it is related to environmental policy, to transport-economic policy, to tourism promotion, to territorial development, etc. For JP providers whose business model consists in bundling services, journey planning is one type of content among others.

Stakeholders are quite consensual with the stepwise approach of DG Mobility and Transport, where multimodal journey planning is a first step and multimodal booking comes later. Nevertheless, it should be reminded that journey planning alone should not be taken as the definitive scope of a self-standing EC policy.

Also, stakeholder feedback as well as recent projects reminds us of the open future of travel information services. Present journey planning is typically an informational transaction at one point in time – a service able to propose a set of one or more transport services answering at least the question “How can I go from location A to location B at a given departure/arrival date and time and under which conditions”. While this is currently the most practical way to communicate a transport offer to a user through the today’s Internet, certainly more practical than the printed timetable books of old times, the future might bring some form of multimodal navigation where pre-trip and on-trip information progressively merge and where mobile devices and information flow through social networks will become more important.

Hence the scope of EC policy should not be uniquely fixed on a reduced ambition of door-to-door journey planning on a website, but should always encompass “EU-wide multimodal travel information services” in general, as written in the ITS directive.

8.1.3. VISION

It is possible to build a vision on the principle that any actor is legitimate to provide journey planning on any network, given that appropriate conditions are respected.

“Any actor” means transport operators, public authorities, travel agencies, service providers, media, etc.

“Appropriate conditions” are those that

- protect the operational requirements of the transport operators and the policy goals of transport public authorities,

-
- ensure fair and open competition among transport operators and other private parties.
 - ensure interoperability of journey planning services.

The ideal definition of multimodal journey planning will be each JP provider's own: in terms of transport modes, of geographic coverage, of delivery channels, of information presentation, etc. There is no unique ideal definition. In the generic definition, a European multimodal journey planner is a service providing information on different routes from point A to point B, combining different transport modes and user criteria (such as the fastest, the cheapest, the greenest, ...), and on different media.

The benefit of this vision is that it allows the co-existence of different business models, which is indispensable for fostering a competitive development of JP services in the environment of the multiple organisational structures that characterise different transport modes, different Member States, and different geographical contexts (especially urban areas).

In that perspective, EC action shall aim at

- defining, harmonising and enforcing the open access to data by any party willing to respect the corresponding conditions,
- by supporting the development and promotion of standards, and by creating a framework for management and certification of reference data sets for international interconnection of journey planners or travel databases (network topology, theoretical offer,...)
- supporting member states in completing territorial coverage where market development is insufficient, by supporting appropriate projects and by providing research, knowledge and methods for justifying the business case of publicly funded journey planning services.
- supporting financially and institutionally the initiation of stakeholders cooperation

There are several types of actors that have the strength to build multimodal journey planners of European dimension. One may think of railway companies, of the urban and regional transport sector and their international cooperations, of service providers from other economic sectors, of the airline sector.

Different actors will address different target groups: some the unfamiliar travellers, some the frequent travellers, in different languages, with different priorities.

Different actors will choose different architectures: some will do distributed journey planning, others will not.

The vision that any actor may provide journey planning on any transport offer gives rise to an editorial responsibility that will be perceived and expected by the public. Editorial responsibility means that the user judges the provider of the information for the total end product even if the provider takes the information from third-party sources. Indeed, users want reliable information. Users know where to find reliable information on their familiar transport networks (this is most often the transport operator's own dissemination channels). But when it comes to multimodal trips involving multiple and/or unfamiliar transport operators, they will search a single trustworthy source of information, and this will be a multimodal JP provider. Users will not care about who ensures data quality behind a multimodal journey planner (specialists will know that the responsibility for data quality is decentralized), but they will care about the editorial trustworthiness of their preferred JP provider.

8.1.4. ISSUES

Considerable work will be required for defining, harmonising and gaining acceptance for the correspondence between accessible data sets and appropriate conditions.

In particular, the definition of which conditions are necessary for protecting the policy goals of transport authorities may take some time, because it requires a reciprocal knowledge of authorities and service providers. The data access conditions must be proportionate and must safeguard against abuse. For example, in a case where a city provides real-time data on the main axes of a strongly congested urban road network to a JP provider, that city might require that the JP provider does not systematically route cars on secondary urban roads that would wrongly be considered as fluid because they are not covered by real-time data. The purpose of the data access conditions based on policy goals may not be that third-party JP providers would be turned into instruments for the promotion of public policy.

The principle of open data access does not provide for full territorial coverage. But the vision proposed above provides for EC support to the member states that search to complete it.

Some transport modes have a low presence in integrated or intermodal traveller information services today. For example, this holds for coaches that are extensively and cheaply available for long and medium distance recreational travel in parts of Europe.

Co-ordination with TAP-TSI implementation is essential for two reasons. First, TAP-TSI defines a long distance public transport backbone data set that will be accessible to third parties at a first stage. This data set includes neither tariff information nor real-time information, which both are relevant for travel information services that interconnect long-distance travel with urban transport. In the vision proposed above, tariff and real-time

information should become accessible at appropriate conditions at some stage, and this must be in line with eventual future steps of TAP-TSI regulation.

Second, while TAP-TSI already now gives rise to direct collaboration in the standardisation bodies between the professional communities of railway and urban transport respectively, it also raises issues of competition between these two types of transport operators. The conditions of reciprocal access to data will need to be equilibrated. Local authorities are sensitive to this, because they are in contractual relations with both types of operators. Indeed, in large European conurbations, local trains are an essential mode for public policy concerning transport: modal shift and CO2 emission mitigation. It is also an essential role of the EC policy to avoid the emergence of monopolistic situations in the EU.

The possibilities for enforcing the accessibility of data produced by transport operators whatever the mode must be investigated. Actions for securing fair competition might be required in this field, in analogy with the reciprocal opening of telecom network assets between private operators.

A future task will be the integration of multimodal terrestrial journey planning with the Global Distribution Systems of air travel. Developments in this direction are still in an early stage.

Furthermore, there is an issue of liability. On the one hand, there are liability issues between the provider of a transport service and the traveller who has bought a ticket and is contractually entitled to that transport service. These issues are identified and are addressed by passenger rights regulation. On the other hand, there are new liability issues that may arise through multimodal journey planning. For example, a traveller could miss his or her airplane because he or she was wrongly informed about the bus connection to the airport. Would there be any liability towards the traveller? Who would be liable, the data provider or the JP provider? Among the stakeholders, transport operators seem to be those who are most sensitive to this issue. Meanwhile, the present study has not encountered existing juridical cases. At present, it seems to be firstly a concern of institutional reputation and brand management rather than of juridical liability. Indeed, the operators firstly complain about additional workload on their helpdesks when unreliable information on their service is given by third parties.

8.2. Key questions addressed to the present study

In the task specification for the present study, DG Mobility and Transport has formulated five key questions. These questions are given below, together with the answers resulting from the present study.

(1) What are the main stakeholder's views on the feasibility of such a European journey planner? Is there enough willingness to cooperate in such a scheme?

The general view expressed by the stakeholders is that the organisational issues of a European journey planner are more challenging than the technical issues. The stakeholders express a quite consensual preference for distributed solutions, while being aware of the organisational and technical limits of distributed solutions, especially concerning real-time data.

While the stakeholders have shown a high interest in the present study, it would be premature to interpret this interest as willingness to cooperate to a given scheme. Indeed, there is no consensus concerning the business model of any common scheme, and no effective cooperation can be undertaken without that. The stakeholders' interest in the present study is motivated by their willingness to understand their future perspectives in European journey planning, and to defend their existing assets.

The present study recommends an open access to data, such that EU-wide journey planning services could be offered by different actors according to different models of cooperation. In this perspective, rather than the willingness to cooperate, it is the acceptance of open data access which is critical. Some stakeholders have expressed support for open data access, others have expressed scepticism. There is a general tendency towards open data access, as represented by the ongoing review of the PSI directive.

(2) A distributed and multi-modal European journey planner would involve a high number of stakeholders. Is there a suitable governance model to build such a service?

Stakeholders prefer distributed solutions because these correspond better to existing organisational structures, facilitate adequate allocation of responsibility for data quality, and accommodate issues related to data ownership.

Existing governance models for distributed journey planners are described in ch. 5. There is no evidence that one of these governance models can be successfully scaled to full EU coverage. The present study does not yield a "preferable option" for the governance of a distributed journey planner.

The option of a singular European journey planner set up and operated under the executive responsibility of the EC is excluded by DG Mobility and Transport.

With the open data access recommended by the present study, EU-wide journey planning can be offered by different actors in a non-exclusive way, in different forms of cooperation under different governance models.

(3) How can we successfully encourage those countries that do not yet have a consolidated national system?

The vision of non-exclusive journey planning services delivered by many actors on the basis of open access to data, as introduced in section 8.1.3 and further explained in the recommendations further below, does not require that a consolidated national system exists in each Member State. It does neither exclude such systems, and indeed integrates them where they exist.

For example, Sweden and Denmark participate to EU-Spirit with consolidated national systems, while Germany participates with regional systems.

For reaching the goal of full geographical coverage of multi-modal journey planners (goal which is ideally matched through consolidated national systems, where they exist), the recommendations of the present study are:

- to regulate the access of JP providers to data, independently of the existence or not of previous national consolidation (recommendation 1)
- to support the production of data that does not exist today, independently of national consolidation (recommendation 4).

(4) Which technical approach is most suitable to connect legacy systems in an efficient and effective way and open for extensions?

The present study recommends prescribing the use of the existing standards Transmodel, NeTEx, SIRI and IFOPT (recommendations 1 and 5).

The cost of connecting legacy systems lies in adapting them to these standards by developing appropriate interfaces. This cost is minimised by choosing the existing standards, since these result from a process of convergence of significant national ancestor standards that have been used in important legacy systems. Putting the technical prescription on a regulatory basis secures the value of the money spent for the system adaptations.

(5) What is the role and use of the various relevant standards? Is there a need to consolidate standards?

NeTEx and SIRI are data interchange standards. The first is intended mainly for scheduled data, the second mainly for real-time data.

IFOPT is intended for harmonising the identification of geo-localised stop points. For interoperable journey planners, the IFOPT entity “stop area” is the most relevant.

Transmodel provides a reference data model that favours convergence of later developments.

The present study recommends prescribing these standards for all data that are made accessible for JP providers. The standards are the result of a consolidation process, and no present need for further consolidation is presently identified.

8.3. Recommendations

The recommendations formulated below are directed to the European Commission, as a support of the EC's work. They reflect the consortium's view, and have not been adopted or in any way approved by the European Commission, DG Mobility and Transport..

They are divided into:

- policy recommendations
- technical and organisational recommendations.

They are preceded by a vision statement.



Vision statement

Multimodal journey planning is a service to citizens, delivered by many actors, in a non-exclusive way.

Initiative 22 of the European Transport White Paper 2011 defines the goal of integrating modes for seamless multimodal door-to-door travel. It sets out the creation of framework conditions to promote the development and use of intelligent systems for interoperable and multimodal scheduling, information, online reservation systems and smart ticketing. This could include a legislative proposal to ensure access of private service providers to travel and real time traffic information.²⁷ The present study addresses this goal for the topic of information, and more specifically, multimodal journey planning.

The vision is to achieve multimodal journey planners with EU-wide coverage by creating a framework where this service can be offered to the public in multiple forms by multiple actors.²⁸

The variety of successfully practiced business cases and the variety of user needs justify the co-existence of many JP services covering the same transport networks. Also, a JP service can have a variety of objectives ranging from public policy (e.g. influencing travel behaviour according to environmental objectives, tourism development, ...) to specific user needs (e.g. persons with reduced mobility).

²⁷ COM(2011) 144 final, p.22-23

²⁸ The following recommendations coincide in parts with those made by the LINK forum. They differ from LINK in that it is not proposed to build a unique pan-European service (with one or many access portals) governed by a single European body. In consequence of this, there is no recommendation in the following on the business model of such a service, nor on its governance, nor on its technical architecture, nor a description of how such a service should look for the users.
See http://www.linkforum.eu/docs/214/LINK_recommendations_brochure_fullversion_29032010.pdf, especially recommendation 1.

Any JP provider who is willing to take editorial responsibility for journey planning should have the liberty to do so. Hard restrictions to this liberty must be limited to situations of incident management. Further editorial rules may be mutually agreed where needed: for example, between JP providers and public authorities where accordance with public policy is an issue. The vision implies open access to data. Data access is conditioned to the use of official standards, which will therefore be taken up fast and widely.

Open data access raises a concern by transport operators, who are data suppliers that it will no longer be possible for them to justify spending for data quality if they have to share the added value created with their own money. This concern can be addressed through appropriate fees paid by third-party JP providers, and/or through contractually defined subsidies from the public authorities to the operators. It has to be reminded that the wide distribution of information in good quality is beneficial for transport operators. Third-party JP providers address additional target groups. Data access fees must not be discriminatory for private third-party JP providers.

The translation of this vision on policy, organisational and technical level is addressed in the following recommendations.

8.3.1. POLICY RECOMMENDATIONS



Recommendation 1

Regulate the access of JP providers to data produced by public authorities and by commercial operators of transport services and facilities.

Open data access is a pre-requisite for the emergence of autonomous (i.e. without public funding) and rich (i.e. combining all the data available) JP services.

Open data access means that it is defined which data are made available by the concerned data producer and under which access conditions. Open access does not mean free and unconditional access: there may be access fees and/or conditions of use.

It is recommended to use a legislative instrument because it enables investments by creating secure conditions. Investments will be necessary, on the one hand, on the side of the data producers that have to implement, operate and maintain the data provision in standard formats. On the other hand, investments shall be encouraged on the side of the JP providers in order to see the emergence of new services with a real European dimension.

A second reason for recommending the use of a legislative instrument is that by warranting open data access, it prevents monopolistic situations and fosters SME business.

The present recommendation remains subject to the usual impact assessment for new legislative instruments. Also, the future evolution of the PSI directive will have to be monitored closely because it influences the need of more specific regulation for open access to traffic and travel data.²⁹ The initial scope of this obligation should be set in such a way that as a legal minimum, all terrestrial transport modes – soft modes, public transport and road traffic – are covered: bike, bus, tramway, rail, coach, and road traffic data. In addition, ferries, cable cars and other special modes should be included where they constitute functional parts of the public transport network.

The initial scope for public transport should provide for coverage on the level of theoretical schedules, detailed at the level of every stop and every departure. Concerning rail transport, the initial scope should be consistent with the scope of content defined in Commission Regulation of 5/5/2011 on TAP-TSI. Concerning bike sharing services, the initial scope should cover the stations and their capacities.

²⁹ Directive 2003/98/EC on the Re-Use of Public Sector Information (PSI) and its national transpositions are not sufficient for granting open access to traffic and travel data. In particular, some national transpositions do not apply to « industrial and commercial public establishments », which concerns many transport operators. The Commission is currently working on a review of the PSI directive.
(see http://ec.europa.eu/information_society/policy/psi/index_en.htm).

For subsequent extensions of scope, see recommendation 2.

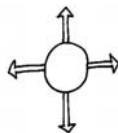
By data access conditions, we mean:

- Technical standards. The legislation must guarantee that a common technical standard is applied. It should leave all technical prescriptions to the standards and should not unnecessarily restrict the technical solutions.
- Financial terms. The legislation must set out the principles and limits of eventual fees for data access.
- Conditions of use, as far as necessary for protecting the quality of information, the operational interests of the transport operators and authorities in situations of incident management, and the policy goals of transport authorities.

Legislation on data access must provide for procedures for verification of the conformity to standards and of the respect of the conditions of fair use. It must allow data providers to close access to a party that does not respect the conditions of use.

The legislation must be such that the claim to data access can be enforced by legal action by the party requesting access. Also, the reliability of data provision must be enforceable. As an example, article 16 of Council Regulation (EEC) 2299/89 on computerised reservation systems in air transport provides for fines to undertakings that supply incorrect information or produce incomplete records.

The principle of open access to data may conflict with existing situations of exclusivity. Such situations provide the private business case for reduced or zero public cost in data organisation (e.g. Czech case IDOS), but limits further developments. The conditions and the process for a transition to open data access should be further investigated.



Recommendation 2

Progressively extend the scope of legislation on data access.

We recommend to progressively extending the scope of content towards air transport, towards road traffic and parking data, towards real-time data, and towards fare and ticketing information. This requires that significant issues of commercial competition and technical issues be resolved on the way, and requires strong coordination between related policy areas according to recommendation 3.

The extension towards ticketing information addresses the limit of the scope of the present study on multimodal journey planning. However, the progressive integration of JP

information and ticketing transactions is essential for meeting the user needs and for maintaining the strategic objective of seamless travel in Europe.

The risk with progressively extending legislation is that progress might be slow, and the emergence of new services delayed. The stepwise approach should therefore be accompanied by on-going support to projects and initiatives that go beyond the initial scope of the regulation, as today real-time information is available on a lot of networks and should be included in multimodal journey planners where useful. Also, a road map for the different stages of extending the scope of regulation should be designed in parallel to the initial regulation.



Recommendation 3

Coordinate EC policy on different transport modes and on data access.

Legislation on access to data will impact different policy areas which must therefore be coordinated.

- The integration of fare and booking data on rail passenger transport must be addressed according to recommendation 2. This must be considered in close cooperation with the sectoral policy in rail transport and further regulation on interoperability in « telematics applications for passenger services ».
- Information on air transport is mainly delivered through computerised reservation systems (CRS), also called Global Distribution Systems. Regulation (EC) No 80/2009 establishes a harmonised code of conduct regarding the use of CRS in order to ensure fair competition and to protect consumers' rights. The regulation applies to air transport services and to rail transport products which are incorporated alongside with air transport products in the principal display of a CRS.³⁰ The competent bodies of the EC must be involved when considering the integration of air transport information in multimodal journey planning.
- Inclusion of road traffic in multimodal journey planning needs to take into account the relevant developments in the road sector, such as future solutions for coordinating road traffic management measures with navigation devices, and growing availability of parking information, in particular at intermodal connection points.
- Directive 2007/2/EC establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) aims at making spatial data compatible and usable

³⁰ http://europa.eu/legislation_summaries/transport/air_transport/tr0025_en.htm

in a transboundary context. Transport networks are one of 34 spatial themes within INSPIRE. The Directive progressively gives rise to a series of binding regulations.³¹

- The Commission is currently working on a review of Directive 2003/98/EC on the Re-Use of Public Sector Information (PSI). The review will possibly impact the accessibility of transport and traffic data.³²



Recommendation 4

Support Member States, local authorities and industry in the production of data that does not exist today.

Current coverage of data on the transport offer in the EU is fragmentary across the EU. Reaching full data coverage is an important objective for multimodal journey planning, because fragmentary coverage is difficult to understand for users, and hampers service quality by limiting the proposed journeys to where coverage is given.

Completing gaps in data coverage is a big task that must be done in an economically efficient way, and in a way that ensures that all data are subsequently maintained up-to-date. By not taking the initiative for completing gaps in data coverage, the EC leaves the initiative to public and private stakeholders of multimodal journey planning, who are better suited for conducting the task according to specific political priorities and economic conditions.

The risk with leaving the initiative to territorial and commercial stakeholders is that progress might be slow in some areas, given the significant cost of completing data coverage. The EC should identify the gaps and define a policy to support their filling. Regarding financial support, see recommendation 7.

³¹ See <http://inspire.jrc.ec.europa.eu/>

³² See http://ec.europa.eu/information_society/policy/psi/index_en.htm

8.3.2. TECHNICAL AND ORGANISATIONAL RECOMMENDATIONS



Recommendation 5

Ensure technical interoperability of data from different sources. .

The core public transport data set for EU-wide interoperability of journey planning services are shared reference data on “stop areas” as defined by IFOPT.

Stop areas are where the complex data sets intersect that can be managed autonomously by different data producers. When two data producers use shared reference data for those stop areas where their networks intersect, and when the two data sets are otherwise coded according to the same standards, then the data sets become interoperable and a JP provider can combine the two data sets and offer a seamless JP service. Hence, standardisation must extend to the whole data sets, but most data can be managed autonomously by the concerned data producers while the identification and description of stop areas must be managed jointly.

It is recommended to define IFOPT as mandatory standard for these reference data, and to ensure proper coordination of how IFOPT is applied by each Member State. This should be part of the specifications according to the ITS Directive.

Maintenance of these reference data must be allocated to officially designated authorities, each with a defined perimeter in terms of geography and/or transport modes. Further investigation must show if the use of legislation is necessary for implementing this recommendation.

It is recommended to lay the obligation of maintaining reference data on stop areas on each Member State for its territory, leaving each Member State free to allocate the responsibility within its jurisdiction and to determine how this activity is financed.

This recommendation entails the necessity of creating reference data where it does not exist today. This concern is related to recommendation 4.



Recommendation 6

Monitor the compliance to the rules concerning data access.

The existence of contractual and/or competitive relations between the transport operators and transport authorities that will have to implement the open data access constitutes a risk of slow or insufficient implementation, notwithstanding the existence of legislation

according to recommendation 1. Legal means for enforcing the implementation of the rules on data access will be given by usual infringement procedures.



Recommendation 7

Define budget needs for upcoming EC finance programs.

It is recommended to assess the opportunity for financial support by the EC for:

- Projects for preparing the terms of future extensions of the scope of regulation on open data access. Such projects must address the technical, standardisation and commercial issues related to sharing fare and booking data, and to real-time data.
- Technical adaptations to existing systems in order to ease the migration from proprietary data formats and interfaces to standard formats and interfaces. Criteria of eligibility and of priority must be elaborated.
- Creation of data coverage where it does not exist today. Criteria of eligibility and of priority must be elaborated.
- Coordination of Member States for the management of reference data on stop areas.

Independently of the present recommendations, multi-modal journey planning offers many topics for future R&D projects and should continue to be eligible for R&D funding.

Specific standardisation activities for distributed journey planning (e.g. DJPS, see section 6.4) are not mentioned here, since the present status of standardisation is sufficient for the implementation of the present recommendations. Nevertheless, financial support for further standardisation of distributed journey planning may become opportune for resolving issues related to sharing fare and booking data and to real-time data, as mentioned under the first bullet point above.

8.4. What to include in the specifications³³

The recommendations presented further above lead to a proposed mix of policy actions that includes:

- Issuing specifications within the framework of the ITS Directive;
- Regulating the access to data produced by public authorities and by commercial operators of transport services and facilities.
- Facilitating stakeholder involvement and the coordination of policy areas on EC level;
- Defining the terms of reference and the organisation for
 - o EU-wide coordination of the management of reference data,
 - o monitoring of the compliance to rules of open data access on EU level;
- Establishing a funding program and related eligibility criteria for

³³ According to Art 6 of the ITS Directive, “the Commission shall first adopt the specifications necessary to ensure the compatibility, interoperability and continuity for the deployment and operational use of ITS for the priority actions”.

Multimodal journey planning falls into the scope of priority action (a) “provision of EU-wide multimodal travel information services” (Art. 3).

According to Annex I of the Directive, the specifications for priority action (a) shall include “the definition of the necessary requirements to make EU-wide travel information services accurate and available across borders to ITS users, based on:

- the availability and accessibility of existing and accurate road and real-time traffic data used for multimodal travel information to ITS services providers without prejudice to safety and transport management constraints,
- the facilitation of the electronic data exchange between the relevant public authorities and stakeholders and the relevant ITS service providers, across borders,
- the timely updating of available road and traffic data used for multimodal travel information by the relevant public authorities and stakeholders and the relevant ITS service providers, across borders,
- the timely updating of multimodal travel information by the ITS service providers.”

According to Art. 4 of the Directive, “ ‘specification’ means a binding measure laying down provisions containing requirements, procedures or any other relevant rules.”

- o Technical adaptations to existing systems in order to ease the migration from proprietary data formats and interfaces to standard formats and interfaces,
- o Creation of data coverage where it does not exist today,
- o Projects that prepare the terms of the future extensions of the scope of open data access.

The specifications should:

1. Establish the principle of open data access;
2. Define the initial scope of open data access in such a way that
 - i. all terrestrial transport modes – soft modes, public transport and road traffic – are covered: bike, bus, tramway, rail, coach, road traffic data. In addition, ferries, cable cars and other special modes should be included where they constitute functional parts of the public transport network;
 - ii. data coverage is on the level of theoretical schedules, detailed at the level of every stop point and every departure,
 - iii. concerning rail transport, the initial scope is consistent with the scope of content defined in Commission Regulation of 5/5/2011 on TAP-TSI,
 - iv. concerning bike sharing services, the initial scope covers the stations and their capacities;
3. Prescribe the technical standards Transmodel, IFOPT, SIRI and NeTEx for all data that fall into the scope of open data access and define, as far as necessary, how they shall be applied;
4. Define the principles and limits of eventual fees for data access, and how they shall be justified;
5. Define the obligations of data providers and data users for protecting the quality of information and ensuring timely update by all parties, and if opportune, state these obligations in terms of the technical standards or of a common license agreement;
6. Define the principles and limits of the conditions of fair use that can be requested by data providers and public authorities on the ground of safety and transport management constraints;

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7. Provide for procedures for verification of the conformity to standards, fee calculation rules, quality obligations and conditions of fair use, and for action in case of non-conformity;
 8. Define the timeline and the consistency of subsequent extensions of scope towards real-time data, fare and ticketing information, air transport, road traffic and parking data.