Harmonising European ITS Services

Traveller Information Services

CO-MODAL TRAVELLER INFORMATION

Deployment Guideline

TIS-DG07 | VERSION 02-02-00 | DECEMBER 2015

The Deployment Guidelines have been developed in EasyWay, EIP and EIP+
Co-financed by the European Union
Trans-European Transport Network (TEN-T)

Support

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Preface (2016)

After the EasyWay project ended in 2012, the Deployment Guidelines have been updated by the EIP / EIP+ projects. They focussed on updating Best Practice and did neither have the capacity nor the intention for a full revision of the text, since especially the Member State adoption of the guidelines' requirements form a huge asset of European harmonisation. In the light of recent European Delegated Regulations, the EU EIP platform will now consider a full revision of the format and the content of the whole set of Deployment Guidelines.

Preamble (2012)

EasyWay is a cooperation of road authorities and road operators from 27 European countries that have teamed up to unlock the benefits of cooperation and harmonisation in the deployment of Intelligent Transport Systems (ITS) on Europe's major road network. ITS as a technology is a known contributor to sustainable mobility in terms of improved safety, efficiency and reduced environmental impact. Nevertheless, fragmented deployment on a national level will fail to deliver seamless European services and will not contribute to a coherent European Transport network. The European Member States have consequently launched the EasyWay project together with the European Commission as a platform to harmonise their ITS deployments.

This document has been drafted by EasyWay as part of the set of documents containing the 2012 version of the EasyWay Deployment Guidelines (DG 2012). These guidelines have been developed by EasyWay experts and practitioners. They have undergone a thorough review by international domain experts in an intense peer review exercise and they have been validated by the participating Member State Partners of EasyWay in an extensive formal Member State consultation process, which finally led to their adoption as basis for all deployment activities in future EasyWay phases.

EasyWay as a project is not a standardisation body, nor does it have any power to legally constrain the Member State in their national deployment activities. It is therefore crucial to understand that these documents are neither technical standards, nor are they specifications as they would be required for such cases, e.g. as currently developed by the European Commission as their part of the implementation of the ITS Directive 2010/40/EU. But since a certain level of strictness in compliance is required to achieve the intended goal of the EasyWay Deployment Guidelines – harmonisation and interoperability in Europe – the guideline documents are written in a way that clearly defines criteria that deployments have to fulfil in order to claim overall compliance with the guideline.

Although not legally binding in any sense, compliance may be required for the eligibility of deployments in future ITS road projects co-funded by the European Commission. Deviation from compliance requirements may nevertheless be unavoidable in some cases and well justified. It is therefore expected that compliance statements may contain an explanation that justifies deviation in such cases. This is known as the "comply or explain" principle.

Although not standards themselves, the EasyWay DG2012 Deployment Guidelines in some cases do mention – and sometimes require – the use of such standards. This is the case in particular regarding the use of the CEN/TS 16157 series of technical specifications for data exchange ("DATEX II"). Although standardised data exchange interfaces are a powerful tool towards harmonised services in Europe, it must be understood that real world deployments have to fit into existing – and sometimes extensive – infrastructures and investment in these infrastructures must be protected. It is therefore important to note that the use of DATEX II mentioned below as a MUST is referred to implementation of "new" data exchange systems and not the utilisation of the existing ones, unless these latter affect harmonisation of deployments or interoperability of services.

Service at a glance

SERVICE DEFINITION

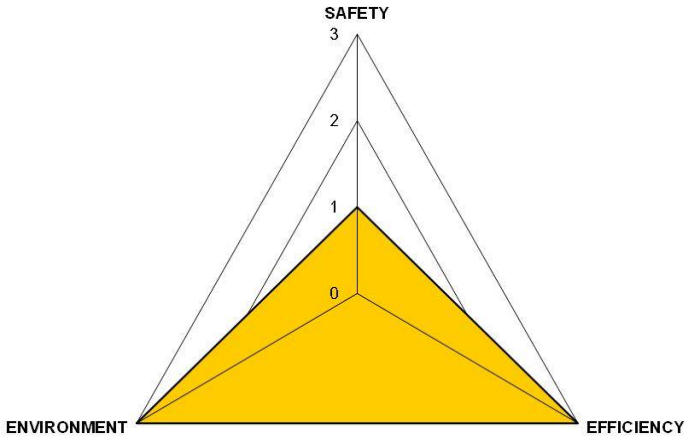
Co-modal traveller information services offer in parallel comparative information of different modes/means of transport (multi-modal) and/or the combination of different modes/means of transport within the same route (inter-modal). The services offer information for at least public transport, car transport and usually pedestrian and bicycle transport.

The term "co-modal" was coined by the European Commission as an umbrella term integrating the more common terms multi-modal and inter-modal. The term multi-modal is commonly used within the area of traveller information services in the meaning of offering parallel information for more than one mode/means of transport. Inter-modal services offer in addition the combination of several modes/means of transport within one route.

SERVICE OBJECTIVE

Co-modal traveller information services can foster a modal shift towards reputed more environmental-friendly modes/means of transport and lead to a more efficient network operation as well as a better utilization of the transport infrastructure. The end users are enabled to select an appropriate and efficient mode/means of transport or an inter-modal combination of different transport modes/means. Thus the end users receive comprehensive information on alternative routes (including different means of transport) and the public mobility as a whole is facilitated.

SERVICE BENEFIT RADAR



EUROPEAN DIMENSION

European challenges regarding co-modal traveller information services concern the service coverage (geographical and time availability), their continuity across corridors and TEN-T network interfaces as well as their language-independence characteristics. The basis for the services are a well-defined common or at least interoperable geo-referencing system, an integrated data model, data formats and an appropriate definition of exchange protocols which enable the integration of various data from different sources for co-modal service applications. A further important task is the harmonisation of the look & feel of the services.

Existing deployments and traveller information requirements across Europe are currently heterogeneous whilst differences in national policies and investment strategies will guide future deployment. By defining the Levels of Service and criteria future deployments can be made in line with this progression towards greater European harmonisation of service levels. Recommendations are given to provide this service in a more European context.

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List of abbreviations

AGORA-C	ISO Standard 17572-3 Intelligent Transport System (ITS)—Location Referencing for Geographic Databases—Part 3: Dynamic Location References, also known as “AGORA-C”
CEN	European Committee for Standardization
DATEXII	Data exchange specifications for traffic management and information
DELFI	Durchgängige ELektronische FahrplanInformation
GDF	Geographic Data Files
GIP	Graph Integration Platform
ICT	Information and communication technology
INTREST	Intermodal referencing system for traffic-related data
ISO	International Organization for Standardization
ITS	Intelligent Transport Systems
NeTEx	Network Exchange (NeTEx) CEN TC 278 WG9 NeTEx is a prCEN/ Technical Standard currently in development. The goal of NeTEX is to provide an efficient European wide standard for exchanging Public Transport schedules and related data.
OpenLR	Open, Compact and Royalty-free Dynamic Location Referencing
PT	Public Transport
REF-AUS	Referenzdatendienst Fahrplanauskunft
SIRI	Service Interface for Real Time Information
VDV	Verband Deutscher Verkehrsunternehmen
VMS	Variable Message Signs
WWW	World wide Web
TMC	Traffic Management Channel
TMS	Traffic Management Services
TPEG	Transport Protocol Experts Group (standard)
UML	Unified Modelling Language
VMS	Variable Message Sign
FR<#>	Functional requirement <number>
OR<#>	Organisational requirement <number>
TR<#>	Technical requirement <number>
CL&FR<#>	Look and feel requirement <number>
LoSR<#>	Level of service requirement <number>

1 Introduction

1.1 The concept of the EasyWay Deployment Guidelines

1.1.1 Preliminary note

This document is one of a set of documents for the EasyWay project, a project for Europe-wide ITS deployment on main TERN corridors undertaken by national road authorities and operators with associated partners including the automotive industry, telecom operators and public transport stakeholders. It sets clear targets, identifies the set of necessary European ITS services to deploy (Traveller Information, Traffic Management and Freight and Logistic Services) and is an efficient platform that allows the European mobility stakeholders to achieve a coordinated and combined deployment of these pan-European services.

EasyWay started in 2007 and has since established a huge body of knowledge and a consensus for the harmonised deployment of these ITS services. This knowledge has been captured in documents providing guidance on service deployment - the EasyWay Deployment Guidelines.

The first iteration of the Deployment Guidelines mainly captured best practice. This strongly supported service deployment within EasyWay by:

- making EasyWay partners in deployment aware of experiences made in other European deployment programmes.
- helping to avoid making errors others had already made
- reducing risk and facilitating efficient deployment by highlighting important and critical issues to consider

Meanwhile, this best practice has already successfully contributed to ITS deployments across Europe. It is now possible to take the logical next step and actually start recommending those elements of service deployment that have proven their contribution to both the success of the local deployment, as well as the European added value of harmonised deployment for seamless and interoperable services.

1.1.2 Applying Deployment Guidelines – the “comply or explain” principle

The step from descriptive best practice towards clear recommendations is reflected in the document structure used for this generation of the Deployment Guidelines. Apart from introduction and the annexes that cover specific additional material, the Deployment Guidelines consist of two main sections:

Part A – this part covers the recommendations and requirements that are proven to contribute to successful deployment and have been agreed by the EasyWay partners as elements that should be part of all deployments of this particular service within the scope of EasyWay. Thus, the content of this section is prescriptive by nature. EasyWay partners are expected to ensure that their deployments are compliant with the specifications in this section. Wherever concrete circumstances in a project do not allow these recommendations to be followed fully, EasyWay partners are expected to provide a substantial explanation for the need for this deviation. This concept is known as the “comply or explain” principle.

Part B – this part offers an opportunity to provide more valuable but less prescriptive information. Supplementary information may be contained including – but not limited to – regional/national examples of deployment and business model aspects like stakeholder involvement or cost/benefit analysis results.

1.1.3 Use of Language in Part A

It is essential for every prescriptive document to provide specifications in a well-defined and unambiguous language. There are various definitions that clarify the use of particular words (such as those listed below) within their prescriptive texts.

For the purpose of the EasyWay Deployment Guidelines, the well-established provisions of the RFC 2119 (http://www.ietf.org/rfc/rfc2119.txt, see (1)) are used, which is used to specify the basic Internet standards:

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119.

An overview of the keywords, their meaning and the possible answers in the context of part A provides the following table. In general the keywords in brackets are possible, but their use is not recommended in order to avoid confusion which may arise as a consequence of different common linguistic usage of the terms in the different EU member states.

Requirement wording	Meaning in RFC 2119	Meaning in EasyWay	Possible checklist answers
MUST (REQUIRED, SHALL)	the definition is an absolute requirement	there may exist insurmountable reasons to not fulfill (e.g. legal regulations…)	**fulfilled: yes** **or** **Fulfilled: no - explanation of insurmountable reasons**
MUST NOT (SHALL NOT)	the definition is an absolute prohibition		
SHOULD (RECOMMENDED)	there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.	The Definition is very close to a "MUST", "MUST NOT" Meaning in EasyWay conform to RFC 2119	**fulfilled: yes** **or** **Fulfilled: no - with explanation**
SHOULD NOT (NOT RECOMMENDED)	there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label		
MAY (OPTIONAL)	The item is truly optional. One deployment may choose to include the item because of particular local circumstances or because it is felt to deliver a special added value	Meaning in EasyWay conform to RFC 2119	**fulfilled: yes - with explanation** **or** **Fulfilled: no**

Table 1: Part A - requirement wording

Note: the capitalisation of these keywords that is frequently used in IT standards is not recommended for EasyWay Deployment Guidelines.

The use of this 'requirements language' allows the direct transfer of the requirements stated in part A to a compliance checklist.

The following paragraph gives an example for a functional requirement:

Functional requirement:

- **FR2:** Data and information collected by both automatically and non-technical sources must be based upon both a consistent geographic reference model and a time validity model, which both **must** be part of data description.

Beneath "Requirement" a new semantic element "Advice" is proposed for part A, which has not the character of a hard requirement but of a "recommendation" and hence must not be listed in the compliance checklist. "Advice" is not immediately related to the three pillars of ITS-service harmonization (Interoperability, Common look & feel, Quality criteria) but to "inner features" of an ITS-service. Nevertheless such an element delivers a European added value and hence should be addressed by the deployment guidelines.

The notation for using the advice element in the text is as follows:

Organisational advice:

- Clear definitions of organisational aspects are a crucial precondition for the successful implementation of a "Forecast and real-time event information service" and should be documented and accepted of all involved parties/partners in form of a Common partner arrangement/MoU - Memorandum of understanding, which establishes the details of co-operation.

1.2 ITS-Service Profile

1.2.1 ITS-Service Strategy

1.2.1.1 General Service Description

Co-modal traveller information services offer in parallel comparative information of different modes/means of transport (multi-modal) and/or the combination of different modes/means of transport within the same route (inter-modal). The services offer information for at least public transport, car transport and usually pedestrian and bicycle transport.

The term "co-modal" was coined by the European Commission as an umbrella term integrating the more common terms multi-modal and inter-modal. The term multi-modal is commonly used within the area of traveller information services in the meaning of offering parallel information for more than one mode/means of transport. Inter-modal services offer in addition the combination of several modes/means of transport within one route.

Co-modal traveller information services require data from the different transport modes road, rail, water- and airborne transport, walking, cycling and additional services such as parking.

The development of co-modal services has to be divided into **two general parts**:

- Data gathering, data processing and data transmission within the technical system of a co-modal traveller information system itself, the "**backend system**" of the service.
- Processed data provision to user interfaces (e.g. internet portal). This means that the processed data has to be transmitted in a certain format (e.g. xml) via a certain protocol and finally the data will be presented in the user **frontend** interface.

Co-modal traveller information services – backend system:

By entering travel demands (i.e. travelling from A to B within a certain time frame) on the Internet or on a mobile device the user receives co-modal information on travel options for road, rail, public transport, including if applicable water and air transport (including walking and cycling, e.g. to the first public transport stop on the route). The service normally includes pre-trip (and on-trip if available) public transport information as well as – if available up-to-date or predicted - road traffic information. Information given to the users can include: trip itineraries with predominantly static travel times; parking information/guidance; environmental impact; to a certain degree estimations of travel costs (e.g. for car traffic). The backend system combines all the different data sources to enable the comprehensive co-modal service provision as just described.

Co-modal traveller information services - frontend:

With the service frontend users interact directly and co-modal services are provided by the following carriers, e. g.

- Internet
- mobile devices
- in-car devices (radio, navigation systems)
- VMS (for VMS please refer to the EasyWay Deployment Guideline TMS-DG05-08 "Incident Warning and Management")

Internet portals (websites) offer a well-structured access to co-modal traveller information. There are two options for the design of such portals:

- User can be directed to Internet-sites with appropriate traveller information via appropriate links (collection of links in one portal)
- The system integrates all co-modal information directly either
  - by on-the-fly calculation on decentralized systems
  - by integration of different service providers` data into one database

Portals can offer Traveller Information Services with static and/or dynamic data. Information can be given at the regional, national and particularly at the international level.

In the past years the former separation of pre-trip and on-trip services has more or less disappeared through the development of services offered on smartphones and the growing penetration of the same devices in the public.

1.2.1.2 What is the Vision?

Co-modal traveller information services can foster a modal shift towards reputed more environmental-friendly modes/means of transport and lead to a more efficient network operation as well as a better utilization of the transport infrastructure. The end users are enabled to select an appropriate and efficient mode/means of transport or an inter-modal combination of different transport modes/means. Thus the end users receive comprehensive information on alternative routes (including different means of transport) and the public mobility as a whole is facilitated.

1.2.1.3 What is the Mission?

Currently a widespread patchwork of inhomogeneous services exists across Europe. These services are partly operated by public transport companies, public authorities, but also private providers. Most services are limited to local or maximum regional geographic coverage which often corresponds to political and administrative borders and not necessarily to road user and traveller needs. These services are almost mature and are under a steady improvement process.

The co-modal service coverage on European level is like a huge blank area. Only few services exist in Europe.

In summary one can say that co-modal traveller information services represent a new field for many EasyWay partners and there does not yet exist a common European wide view of how a mature co-modal service should look like in the sense of its technical, functional and organisational composition including its look and feel.

The Deployment Guideline pays this special situation of “co-modal service immaturity“ attention in often using low requirement levels such as “may” or “should”. The mission is now to steadily improve the DG in accordance to new experiences and deployments. It is very important that EasyWay partners follow in such an early service development process the DG as this is a huge chance to easily gain harmonization already with the service implementation starting point.

1.2.1.4 EasyWay harmonization focus

This deployment guidelines main focus is to provide the necessary basis for the harmonisation of especially **web based co-modal traveller information services**. The guideline does neither handle co-modal services for goods transports nor co-modal information systems as part of the motorway infrastructure (e.g. VMS showing Park&Ride information).

1.2.1.5 Distinctiveness from other ITS-services

For the determination of a co-modal route it is necessary to apply data from different sources, in particular from data bases of traffic management systems, public transport data bases and parking data bases. Furthermore, a geographic data base is required, which includes the entire road network as well as the public transport network with stops, lines and stations and parking facilities.

When providing a customer oriented TIS, it might be necessary to merge two or more of the core services in a modular way in order to better satisfy the end-users needs.

- Co-modal services should include real-time event information and warning services (incl. incidents): This information is applied in order to determine the optimal route and traffic modes for a given origin and destination under consideration of the current events, restraints and hazardous situations.
- Co-modal services should include traffic condition information: This information is needed in order to consider the current traffic situation and to compute travel times in a dynamic way.
- Co-modal services should include travel time information: Travel time is of basic importance for the determination of the optimal route and most relevant information for the traveller. Co-modal route alternatives are used to be compared by the corresponding travel times. For the comparison the current

and the forecast travel time of individual modes should be compared with each other for the trip to take into account the current traffic situation for the choice of transport mode.

- Co-modal services should include speed limit information: This information is normally used in a static way, i. e. given static speed limits in the road network are used to compute travel times, which are required for the determination of the best route. Dynamic speed limit information is usually not applied for co-modal services, but may support a more precise route calculation.
- Co-modal services should include weather Information: This information helps to compute travel times in a more appropriate way and may influence the modal choice.
- Co-modal services compare the travel times for the different means of transport in a fair way. All travel times should be realistic for the relevant departure time and measured from door to door. For private cars in urban areas the time for parking and the footpath from and to the car must be included. Costs should also be displayed that arise of the change of transport (e.g. from individual to public transport), or e.g. when parking lots are recommended.

1.2.2 Contribution to EasyWay Objectives

1.2.2.1 Service radar

A general overarching description of TIS-services is outlined in the "Traveller Information Services, REFERENCE DOCUMENT, TIS Deployment Guideline Annex, Version 02-00-00, Chapter 2.2 Contribution to EasyWay Objectives".

The graph below provides a quantification of the added value of "Co-modal Traveller Information" regarding the three main objectives of EasyWay which are: safety, efficiency and environment. The applied scales for the service radar are based on an expert view and not on specific scientific analysis.

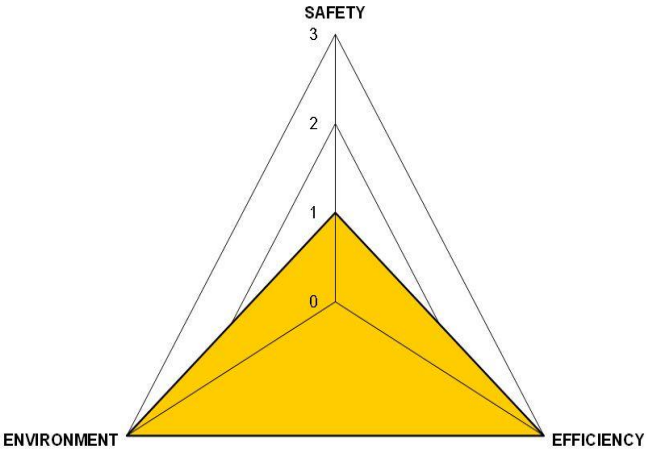

Figure 1: Service radar "Co-modal traveller information"

1.2.2.2 Safety

The safety impact of co-modal services is mainly a result of the increase of network efficiency accompanied by improved traffic flows and reduction of possibly hazardous traffic situations (e.g. congestion). As the safety impact is not a direct goal of co-modal services but rather an indirect result of the two other radar impacts of environment and efficiency the radar peak is lower than for the others.

1.2.2.3 Environmental impact

Due to the mode/means of transport comprehensive and also comparative information provision, co-modal traveller information services can foster a modal shift towards reputed more environmental-friendly modes/means of transport. Thus the service radar shows a full peak for (positive) environment impact.

1.2.2.4 Network efficiency

As for environmental impact the same applies for efficiency; co-modal services can optimize the usage of the whole transport network due to information provision for different modes/means of transport whereas the user can choose the most suitable route resp. mode/means of transport.

1.2.3 Current status of deployment

Currently a widespread patchwork of inhomogeneous services exists across Europe. These services are partly operated by public transport companies, public authorities, but also private providers. Most services are limited to local or maximum regional geographic coverage which often corresponds to political and administrative borders and not necessarily to road user and traveller needs.

The co-modal service coverage on European level is like a huge blank area. Only few services exist in Europe.

The services can be classified in regards to:

- the time of use such as on-trip and pre-trip (depending on the used device; whereas more and more devices enable both, pre-trip and on-trip services) and the location of use e.g. at home, at office, in the car etc.,
- the use of the different transport modes/means,
- the information outcome (i.e. what different co-modal information is provided such as e.g. Park&Ride, Bike&Ride etc.) and visualisation of the service and
- the channel that is used for the data communication (e.g. internet, broadcasting)

The service features and their extent offered by co-modal information services directly correspond with time of use such as planning (pre-trip) or guidance (on-trip) services.

1.2.4 European Dimension

European challenges regarding co-modal traveller information services concern the service coverage (geographical and time availability), their continuity across corridors and TEN-T network interfaces as well as their language-independence characteristics. The basis for the services are a well-defined common or at least interoperable geo-referencing system, an integrated data model, data formats and an appropriate definition of exchange protocols which enable the integration of various data from different sources for co-modal service applications. A further important task is the harmonisation of the look & feel of the services.

Existing deployments and traveller information requirements across Europe are currently heterogeneous whilst differences in national policies and investment strategies will guide future deployment. By defining the Levels of Service and criteria future deployments can be made in line with this progression towards greater European harmonisation of service levels. Recommendations are given to provide this service in a more European context.

2 Part A: Harmonization Requirements

2.1 Service Definition

Co-modal traveller information services offer in parallel comparative information of different modes/means of transport (multi-modal) and/or the combination of different modes/means of transport within the same route (inter-modal). The services offer information for at least public transport, car transport and usually pedestrian and bicycle transport.

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2.2 Functional Requirements

2.2.1 Functional architecture

The following figure gives an overview of the functional and information architecture of co-modal services.

The blue boxes show specific co-modal system requirements. The yellow text reflects the necessary standards/specifications for co-modal services.

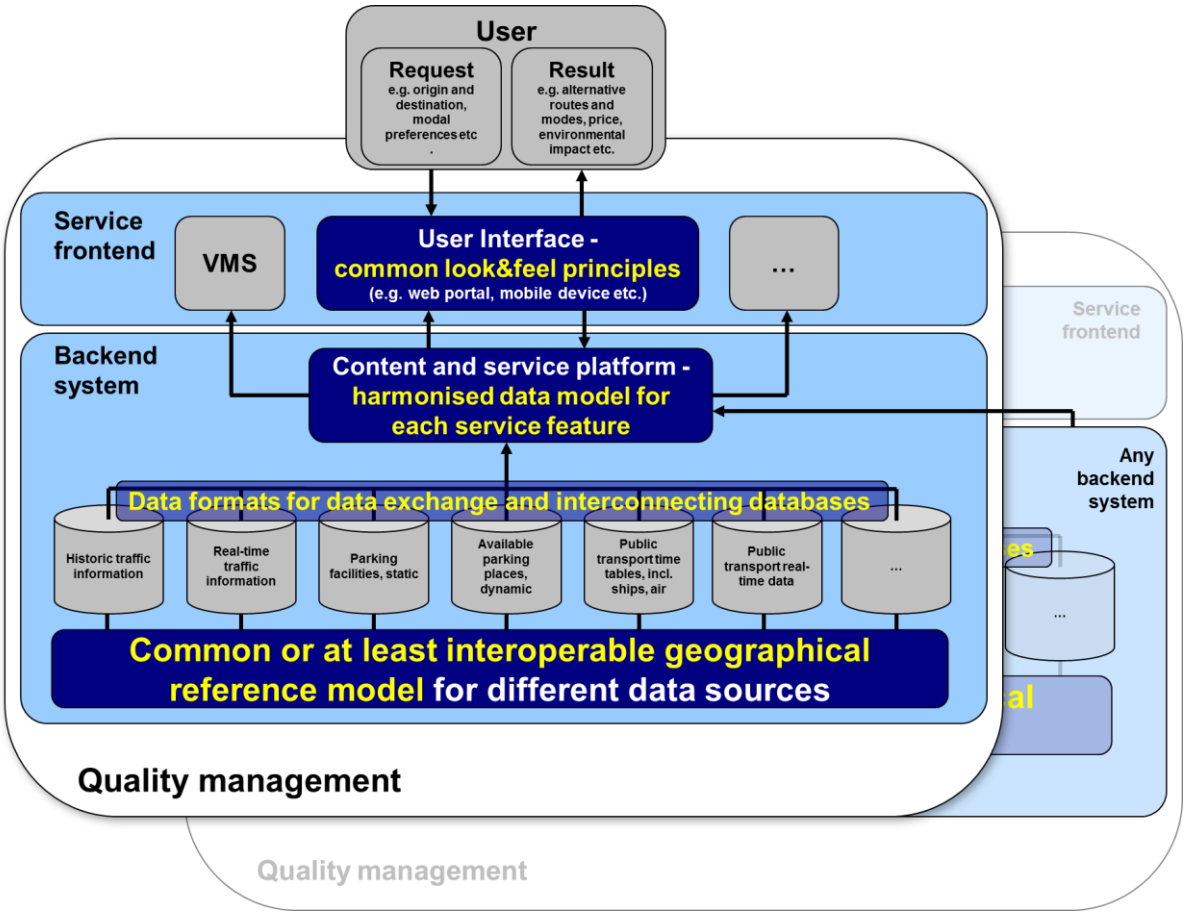


Figure 2: Functional and information architecture of co-modal information services

Functional requirements:

The following functional requirements are derived from the blue boxes of Figure 2:

- **FR1**: Co-modal TIS **must** be based on a common or at least interoperable geographical reference model to be able to integrate different data sources which most likely use different location referencing methodologies and thus come to a common location referencing denominator.
- **FR2:** Co-modal TIS content and service platform **should** be based on a harmonised data model for each service feature. Service developer **should** orient the data model on already existing best practices (s. chapter 2.4.2) as yet no common standard exists.

2.3 Organisational Requirements

The following figure gives an overview of the organisational characteristics of co-modal services.

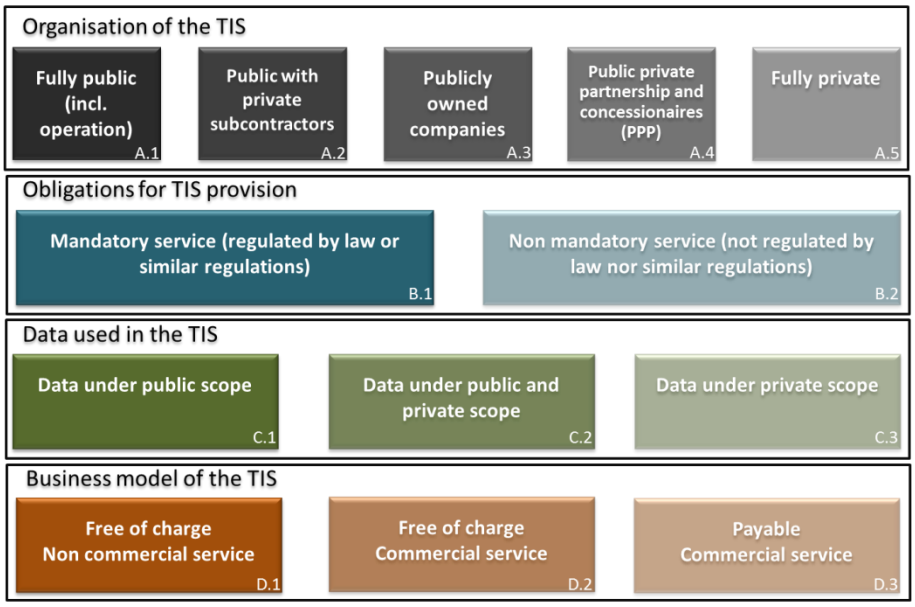


Figure 3: Organisational characteristics of co-modal traveller information services

The following text interprets the four main organisational areas (organisation of the TIS, obligations for TIS provision, data used in the TIS, business model of the TIS) shown in figure 2 in relation to co-modal traveller information services requirements.

1) Organisation of the TIS

It is very important to distinguish between A.1 to A.5. These 5 categories show finally who is responsible for the service. For instance A.2 stands for a service which is operated privately but this is only half the truth as the private service provider acts according to his contract he has with the public. To enable OR2 and OR3 the following organisation is recommended:

Organisational requirement:

- **OR1**: The co-modal service **may** be organised according to the schemas A1, A2, A3 or A4 as shown in Figure 3.

Additional A5 initiatives are not subject of this guideline.

2) Obligations for TIS provision

Public administration act according to the assigned scope of activities which is normally regulated by law or similar regulations. In the field of co-modal traveller information service provision it has therefore to be distinguished between mandatory services and non-mandatory (voluntary) ones.

If the public wants a kind of basic co-modal services it has to be regulated somehow otherwise there is no guarantee for service provision. Only through regulation a seamless co-modal service across Europe is possible. Otherwise the services depend just on the voluntary engagement of local and regional limited initiatives. And this results in a widespread patchwork of inhomogeneous services. In many cases there does not exist clear regulation concerning traveller information services. Public authorities might not see their task in regulating TIS or even in providing TIS and thus leave this area completely to voluntary public initiatives and the private sector. On the other hand in many cases public authorities see their task in traffic control and the provision of warning services to increase traffic safety.

In summary this means that a huge amount of public authorities try to clearly distinguish between traffic control / safety services (= public task) and traffic information services (= voluntary public task and preferable

task of private sector). But does such a separation make sense in the age of information? Where is exactly the border between traffic control/safety measures and information measures? Isn't there a huge impact on safety and also on traffic control when providing good information services? Do travellers rely more on their navigation devices or the fixed signage on the road infrastructure? There are many unsolved questions but it is clear that no mandatory co-modal traveller information services are part of the EasyWay platform yet.

Organisational advice:

- Basic co-modal services organised according to A1-A4 (s. Figure 3) **should** be mandatory services (i.e. B1 as shown in Figure 2) to be able to guarantee the service according to OR2 and OR3.

3) Data used in the TIS

Co-modal services consist of various different data sources. One can distinguish between data under public scope (C.1) which might be operated by private companies but on behalf of public, and data under private scope (C.3), for instance travel profiles from telecommunication companies or both, data under public and private scope (C.2).

4) Business model of the TIS

Organisational requirements:

- **OR2:** Business models could be influenced by commercial considerations which might lead to a preference of specific transport modes/means or other information content. This is one important reason that co-modal services **must** reflect a comparison of modes/means of transport not biased due to commercial motives.

  Note: Co-modal services aiming towards reducing car use may integrate only some functionality dedicated to car transport. In this case unbiased comparison is not relevant.

- **OR3:** Basic co-modal services according to A1, A2, A3 and A4 **should** be free of charge and non-commercial. Advertising respectively financing concepts with participation of the private sector are allowed as far as it is under public control and it does not lead to a preference of any specific transport mode or means of transport.

  Note: In some EasyWay Member States the public sector is not involved directly in the service provision but is compiling and maintaining a transport information data base, which the private service providers (A5) may use in any way they wish. In such cases the public sector supports private services (A5) by maintaining all or part of the data bases utilised by the services, but has no other role in service provision.

Furthermore as most services consist of providing information only it has so far proved to be difficult to create a business model for private service provision. However, it is possible that this situation might change and create a market for value-added services run by private operators. In any case, there should be a basic service available free of charge.

Organisational requirement:

- **OR4:** Under Chapter 2.6.2 the optimum and minimum LoS for co-modal TIS are defined. For the minimum LoS, reflecting also the basic service requirements, one **may** use the following organisational characteristics (following the schema and abbreviations of Figure 3):
  - Organisation of the TIS: **A.1, A.2, A.3 or A.4**
  - Obligations for TIS provision: **B.1**
  - Data used in the TIS: **C.1 or C.2**
  - Business model of the TIS: **D.1**

5) Transport operator obligation

A further important point is the need to regulate respectively oblige transport operators (e.g. private bus companies operating scheduled services, light rail franchisees etc.) to provide information in a common

standardised format so as to enable co-modal journey planning services to be efficiently provided and reduce the not inconsiderable public funding required.

Organisational requirement:

- **OR5**: Public transport operators **may** be obliged by contract to provide their data in a format that is useful and defined by the public authority. A catalogue of the information that must be provided is urgently needed. TAP-TSI may be a good blue print.

6) ITS action plan of the European Commission

The "ITS action plan" of the European Commission (EC) mentions several times the need to develop multi-/co-modal information services. Co-modality is among the priority issues identified by the EC.

Specifically the production and distribution of goods rely on efficient and cost-effective multi-modal logistic chains to organise their transport across the EU and beyond, especially when just-in-time requirements are at stake.

Action 1.5 of the ITS action plan is the "Promotion of the development of national multi-modal door-to-door journey planners, taking due account of public transport alternatives, and their interconnection across Europe". Furthermore Action 2.3 includes: "Support for the wider deployment of an updated multi-modal European ITS Framework architecture for intelligent transport systems and definition of an ITS framework architecture for urban transport mobility, including an integrated approach for travel planning, transport demand, traffic management, emergency management, road pricing, and the use of parking and public transport facilities".

Organisational requirement:

- **OR6**: Co-modal service providers **should** take into consideration the ITS action plan as where co-modality is among the priority issues identified by the EC.

7) ITS directive (2010/40/EU)

Article 3 of the ITS directive (2010/40/EU) explicitly names the EU-wide provision of multimodal traveller information services as priority area for the development of and use of specifications and standards. In priority areas the European Commission shall adopt the specifications necessary to ensure the compatibility, interoperability and continuity for the deployment and operational use of ITS. This includes "the definition of the necessary requirements to make EU-wide multimodal 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 service 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,
- the timely updating of multimodal travel information by the ITS service providers.

Organisational requirement:

- **OR7**: Co-modal service providers **should** take into consideration the ITS directive (2010/40/EU) when developing services.

2.4 Technical Requirements

2.4.1 ICT infrastructure requirements

Co-modal Traveller Information Services backend system requirements are subdivided into three sections:

1) Road transport requirements

- Traffic and road data-collection (including construction sites)
- Monitoring of road and traffic status, including real-time influences on traffic (including incidents)
- Calendar (holidays etc.)
- Databases with road and traffic status
- Databases for Parking (parking places, static and dynamic) and inter-modal exchange points
- Comprehensive road network including foot-paths and cycling facilities.

2) Public transport requirements

- Databases for Public Transport timetables, static
- Basic Database for Public Transport which is geo-referenced on suitable geographical network. (stops, lines, ..)
- Dynamic Public Transport information (delays, cancellations, additional services etc.)
  - Midterm updates of timetables
  - Day specific timetables (VDV REF-AUS)
  - Messages with descriptions
  - Departure time forecasts
- Information at interchanges (interchange times, paths)
- Route information

3) Transport mode comprehensive requirements

- Common or at least interoperable geographic reference
- Interfaces and protocols for data exchange, e.g. between different operators at national and international level
- Interfaces to mobile devices
- User-friendly user interfaces and maps

Technical requirement:

- **TR1**: Co-modal services **should** offer information for public transport, car transport and usually also for pedestrian and bicycle transport.
- **TR2**: Co-modal services aiming towards reducing car use **may** integrate only some functionalities of road transport.
- **TR3**: Co-modal services **should** be based on transport mode comprehensive system requirements (see points 1-3 in chapter 2.4.1)

The availability of www technology and sufficient (broadband) connectivity is a basic requirement for most backend and frontend systems. It is likely that the mobile devices used for the service will also serve the purpose of data collection and reporting on incidents, delays and other relevant co-modal information.

2.4.2 Standards and Agreements: Existing and Required

Co-modal Traveller Information Services require the co-operation of actors from a wide range of different transport modes. The actors can be public and private.

Static data sources are required, e.g.: road/public transport network data, travel times, timetables for scheduled means of transport (short/long-distance), databases for evaluating environmental impacts of different means of transport/types of vehicle, maps. Also suitable dynamic data can be used e.g.: road works, incidents, cancellations or deviations of public transport trips.

The following list of standards and initiatives is subdivided into categories. Co-modal services should choose the standards and initiatives best fitting for their purposes.

- **Interoperable map content standards:**
  - Mapinfo-Interchange-Format
  - Shapefile
- **Interoperable data models for co-modal networks**
  - INTREST
  - GIP
  - GDF (just road network)
- **Interoperable data formats for dynamic location referencing with the focus for individual transport content:**
  - OpenLR
  - AGORA-C
  - TPEG-Loc
- **Interoperable content modelling (data model, format and protocol) with road transport focus for dynamic data:**
  - DATEXII
  - TPEG
  - TMC
- **Interoperable content modelling (data model, format and protocol) with public transport focus for dynamic data:**
  - VDV-453
  - VDV-454
  - SIRI
  - NeTEx
  - Transmodel
- **Protocol and method to connect two PT routing systems**
  - DELFI
  - EU-SPIRIT
- **Standardized protocols and methods to transfer map data and additional map information:**
  - WMS (Web Map Service) / WFS (Web Feature Service)

Technical requirement:

- **TR4**: Co-modal services **should** use and choose the best fitting standards and if no suitable standards exist the services **should** be inspired from initiatives. The standards and initiatives are listed under chapter 2.4.2. The list under 2.4.2 is not exhaustive and other standards which are already widely used can be also used.

2.5 Common Look & Feel

2.5.1 Preliminary remark

Most co-modal traveller information services are designed for the WWW. These internet applications developed their own user interface which is normally oriented at market leaders in the specific domains the service offers, e.g. map navigation oriented on market leaders. The following chapters are oriented on highly sophisticated services and market leaders and are the basis for the elaboration of co-modal services with a common look & feel.

2.5.2 Illustration of co-modal routing information on maps

The colours for the route indication in maps may be used as follows:

- Pedestrian: dark green
- Car: brown
- Bicycle: orange
- Subway: turquoise
- Suburban Train: bright green
- Tram: red
- Bus: blue
- Train: black
- Taxi: yellow

Common look & feel requirements:

- **CL&FR1:** Co-modal services **should** take into consideration the requirements for colour blind and other visually impaired people as far as possible.
- **CL&FR2:** Co-modal services **may** use the colours for means of transport route indication as provided in chapter 2.5.2 as far as these colours have enough contrast to the map background information.
- **CL&FR3:** Co-modal services **should** use different colours to indicate the different means of transport in maps.
- **CL&FR4:** Co-modal services **may** use a common look & feel and colour scheme on the maps shown in the internet as well as for printed maps.

2.5.3 Icons to illustrate the different map contents

The map presentation (only when the service offers this feature) is a main part of a co-modal traveller information service (TIS). Co-modal TIS are very comprehensible services and the map presentation helps users among others to have a better orientation (in the sense of a geographical as well as a comprehensible transport relevant information orientation). This is also a reason to include so called POIs (points of interest) into the map presentation and also to use these POIs very often as predefined origins and destinations for co-modal routing services. Besides these POIs many co-modal TIS show as well traffic relevant information (e.g. congestion warning, road closures etc.) in maps. For the European citizen it is of high added value to harmonize the map presentation (icons used and also the colour scheme for route indication of different means of transport) of such comprehensible and thus also often very complex co-modal traveller information services. The users of these services will experience a much easier and understandable HMI when the map presentation respectively the icons are being harmonized.

Yet no mature enough comprehensive icon set exists. In part B under 0 a comprehensive icon set can be found and it is up to the service provider to follow these icons or not.

Common look & feel requirements:

- **CL&FR5:** Icons **should** be in accordance with prevailing national road codes and where applicable be in line with the requirements of the EW-DG for Variable Message Signs Harmonization VMS-DG01:
  - MS which ratified the 1968 Convention MUST respect the 1968 Convention and SHOULD consider the Consolidated Resolution on Road Signs and Signals (R.E.2);
  - MS which did sign but not ratify the 1968 Convention SHOULD follow the 1968 Convention and also consider the R.E.2.
- **CL&FR6:** Icons **should** be categorized (e.g. in categories for travel information, public institutions etc.; see also example of categories under 0) and **should** follow a common colour scheme.
- **CL&FR7:** Icons **should** use internationally understandable designs and avoid country/region specific designs where possible/applicable.
- **CL&FR8:** Public transport icons for means of transport and public transport stops/stations **may** follow the local public transport operators design.

2.5.4 Common co-modal service provision feature understanding

Bike and ride (B+R)

The common understanding of bike and ride is that commuters and other people use the bike to get to a public transport terminal where they leave their bike and transfer to the public transport system. Some co-modal traveller information services feature B+R but only when the public transport terminal offers a dedicated area for parking bikes. Otherwise the terminal will be not part of the B+R information provision.

Kiss and ride (K+R)

Many railway stations and airports feature an area in which cars can discharge and pick up passengers. These "kiss and ride" facilities allow drivers to stop and park temporarily, instead of the longer-term parking associated with park and ride facilities. In some sophisticated co-modal traveller information services the “kiss and ride” feature has been extended to all public transport stops even when they do not have a dedicated parking facility.

Park and ride (P+R):

Commuters and other people wishing to travel into city centres leave their vehicles at P+R car parks and transfer to the public transport system or carpool for the rest of their trip. P+R car parks are generally located in the suburbs of metropolitan areas or on the outer edges of large cities and have a direct connection to the public transport system.

Car-share park and rides (C+R):

Park and ride schemes do not necessarily involve public transport. Car-share parks are often located near motorway exits in the vicinity of cities and are used for most by commuters and follow the idea of carpooling and car sharing.

Common look & feel requirement:

- **CL&FR9:** When co-modal services provide information on "bike and ride", "kiss and ride", "park and ride" and "car-share park and rides", they **should** use these service features as defined in chapter 2.5.4

2.5.5 User input form as basis for co-modal route information requests

Common look & feel requirement:

- **CL&FR10**: Co-modal services user input forms **may** follow already existing deployments. The input forms can contain input elements such as text fields, checkboxes, radio buttons and submit buttons for the user to complete.

2.5.6 Presentation of co-modal traveller information besides the map presentation

Common look & feel requirement:

- **CL&FR11:** Co-modal traveller information services do not necessarily provide a map presentation. They might offer routing information and / or traveller information besides maps in textual or a graphical way. This information provision **may** follow already existing services (see also chapter 3.1 for already existing services).The presentation of co-modal traveller information besides the map presentation **may** follow already existing deployments.

2.6 Level of Service Definition

2.6.1 Preliminary remark

The scope of EasyWay is to provide Core European Services to the European road users. These services are harmonized in content and functionality, but also in their availability: The road users shall be able to expect a certain services offer in a specific road environment. In order to provide a basis for the harmonization process EasyWay needs a tool to define such environments in an agreed manner. This tool is the Operating Environments – a set of pre-defined road environments combining physical layout of the road and network typology with traffic characteristics.

In essence, EasyWay has agreed on a set of 18 pre-defined Operating Environments (OE) where each OE is a combination of three criteria:

- Physical characteristics – Motorways, other 3/4 lane roads or 2-lane roads
- Network typology – Corridor, Network, Link or Critical spot
- Traffic characteristics – Traffic flow and road safety situations (with optional additions)

For more information and details, visit https://dg.its-platform.eu.

The levels of service of co-modal traveller information services apply to all EasyWay Operating Environments in a very similar manner. Therefore this deployment guideline does not include a table showing the expected optimum and minimum service level of the service criteria in connection to each EasyWay Operating Environment. The expected minimum and optimum LoS can be found in chapter2.6.2.

2.6.2 Level of Service Criteria

2.6.2.1 Level of Service requirements

The Level of Service tables 2, 3, 4 and 5 do not imply any obligation to deploy co-modal TIS or implement all criteria (A)-(Z). However, if a co-modal TIS is deployed and any criteria (A)-(Z) in Tables 2, 3, 4 and 5 is specified as part of that deployment the requirements LoSR1 and LoSR2 apply.

Each table uses criteria in connection with different service levels to describe co-modal traveller information services in the best manner. Through these TIS DG 07 specific criteria/service levels a common denominator has been identified to describe/classify co-modal traveller information services. These tables can be used in different ways:

- When developing a new co-modal traveller information service the tables give you a reference of how the service criteria should be implemented according to their optimum resp. minimum levels.
- Already existing co-modal traveller information services can be classified according to the criteria and service levels implemented and thus a common denominator exists to compare these different services. This will play an important role in future when each part B project will be analysed in accordance to the LoS tables. Thus the user of the DG receives a good overview of the service at a glance.
- For justifying projects which aim to improve the level of service quality of a co-modal traveller information service

The minimum (marked with orange colour) and optimum (marked with green colour) levels in tables 2, 3, 4 and 5 are based on EasyWay expert views and have taken costs and benefits in relation to current (September 2011) general conditions into consideration. The levels are not based on any scientific analysis.

Level of service requirements:

- **LoSR1:** Co-modal TIS **should** reach the minimum (marked with orange or grey colour) level of service as shown in Tables 2, 3, 4 and 5 where any criteria (A)-(Z) is deployed as part of the co-modal TIS.

- **LoSR2**: Co-modal TIS **may** reach the optimum (marked with green or grey colour) level of service as shown in Tables 2, 3, 4 and 5 where any criteria (A)-(Z) is deployed as part of the co-modal TIS.

2.6.2.2 TIS common LoS criteria

	Criteria	Level 0 (no service)	Level 1	Level 2	Level 3	Level 4
A)	User interface (language)	-	Language of service operator	Language of operator and in addition in a common and shared language	Language of operator, in addition in a common and shared language and language of neighbouring regions	Provision of all European languages (preferable by using language independent information catalogues; cf. TMC codes)
B)	Neighbouring Provision	-	local	regional	national	European wide
C)	Local and Secondary Network Information	None	TEN-T road network of service area	TEN-T road network and strategic non TEN-T roads of service area	TEN-T and secondary road network of service area	Whole public road network of service area
D)	Level of detail	n/a (see criteria E) and subsequent criteria)				
	Legend: • Orange: minimum level of service • Green: optimum level of service • Grey: optimum is equal to minimum level of service					

Table 2: Level of service criteria for co-modal traveller information services

2.6.2.3 LoS for inter-modal transportation graphs

	Criteria	Level 0 (no service)	Level 1	Level 2	Level 3	Level 4
E)	Pedestrian information	None	Based on car routing graph with specific attributes	Based on car routing graph and additional pedestrian specific routing graphs for e.g. major parks, terminals, shopping centres etc. for major conurbations	Based on car routing graph and additional pedestrian specific routing graphs for e.g. major parks, terminals, shopping centres etc. for whole service area	Based on car routing graph and further pedestrian routing graphs for major parks, terminals, shopping centres etc. whole service area plus indoor routing
F)	Bicycle informatio	None	Based on car routing graph	Specific bicycle routing graphs	Specific bicycle routing graphs	Specific bicycle routing graphs besides the

	Criteria	Level 0 (no service)	Level 1	Level 2	Level 3	Level 4
	n		with specific bicycle attributes	besides the road network graphs with a coverage of at least major cities/conurbations	besides the road network graphs with a service area wide coverage	road network graphs with a service area wide coverage incl. specific bicycle parking areas
G)	Car	None	Whole road network with routing graph for car traffic	Car routing includes real time traffic information on motorways/major road network	Car routing includes real time traffic information on whole road network	Car routing includes real time plus routing forecast traffic information on major road network
H)	Ship/Ferry	None	Static/real time timetables included for visualization	inter-modal routing information based on static timetables without route visualization on map	inter-modal routing information based on real time timetables without route visualization on map	inter-modal routing information based on real time timetables with route visualization on map
I)	Public Transport	None	Static/real time timetables included for visualization	inter-modal routing information based on static timetables without route visualization on map	inter-modal routing information based on real time timetables without route visualization on map	inter-modal routing information based on real time timetables with route visualization on map
J)	PT operators involved	None	Just one major PT operator (further operator exist)	one major PT operator plus several smaller PT operators	all major PT operators plus several smaller PT operators	all PT operators
K)	Plane	None	Static/real time timetables included for visualization	inter-modal routing information based on static timetables	inter-modal routing information based on real time timetables	
L)	Co-modality (multi-modality, inter-modality)	-	two means of transport compared or connected	all major means of transport compared or connected	all major means of transport compared, two connected	all major means of transport compared and connected
M)	Indoor Routing	None	Major public transport terminals	Public transport terminals and major public buildings	PT terminals, public buildings, shopping arcades and centres	

	Criteria	Level 0 (no service)	Level 1	Level 2	Level 3	Level 4
N)	Address	None	Road sections/segments (interpolated)	House numbers exact	House numbers with exact access/entrance information	
O)	PT stops	None	PT stops as single point coordinates	PT stops with transfer connection information (time-paths between different platforms) without specific entrance information	PT stops with transfer connection information (time-paths between different platforms) with specific entrance information	PT stops with transfer connection information and pedestrian routing feature (e.g. indoor routing) with specific entrance information
P)	Information for handicapped people	None	Public transport (handicapped accessibility)	Public transport with detailed information for handicapped people, including stairs, escalators, elevators and ramps.	PT and public buildings (handicapped accessibility)	PT, public buildings and whole pedestrian graph
Q)	POI	None	Less than 4 of the POI categories (s. below) and not all from the leading POI providers. POI categories: • public institutions • food and beverage sector POI • tourism POIs • culture and entertainment POIs • accommodation	More than 4 POI but not all categories from the leading POI providers	More than 4 POI and all categories from the leading POI providers	All POI categories from the leading POI providers

	Criteria	Level 0 (no service)	Level 1	Level 2	Level 3	Level 4
			POIs • sports and leisure times POIs • shopping and provisioning of services POIs			
	Legend: • Orange: minimum level of service • Green: optimum level of service • Grey: optimum is equal to minimum level of service					

Table 3: Level of service criteria for inter-modal transportation graphs

2.6.2.4 LoS for incident information and dynamic measurement data

	Criteria	Level 0 (no service)	Level 1	Level 2	Level 3	Level 4
R)	Closures on roads	None	Long-term planned closures on motorways and major trunk roads	Long-term planned closures on motorways, trunk roads and road network of conurbations	Besides long-term planned also short-term (daily) planned closures for network as level 2	Real time information about closures for whole road network
S)	Travel time	None	Based on historical data	Based on historical and real time data (measurement data from stationary measurement units on road network)	Based on real time data from stationary and some floating measurement units plus historical data	Based on real time data from stationary and all major floating measurement units plus historical data
T)	Messages (IT and PT)	None	Construction sites or traffic condition not for whole service area	Construction sites or traffic condition for whole service area	Both construction sites and traffic conditions for whole service area	traffic conditions for whole service area from multiple data sources
U)	Weather (road and area)	None	Area weather information	Area and specific road weather information derived from area weather	Area and specific road weather information based on stationary weather measurement units	Area and specific road weather information based on stationary and xFCD weather measurement units plus forecast
	Legend: • Orange: minimum level of service • Green: optimum level of service • Grey: optimum is equal to minimum level of service					

Table 4: Level of service criteria for incident information and dynamic measurement data

2.6.2.5 LoS of usability of co-modal TIS

	Criteria	Level 0 (no service)	Level 1	Level 2	Level 3	Level 4
V)	Via points and route instant adjustment	None	Via points input through input mask	Via points input through input mask and map	Via points input through input mask and map plus instant route adjustment in map	
W)	Route visualization	None	Lists	lists + static or interactive maps	lists + interactive maps (with smart functions: zoom, panning, etc.)	lists + interactive maps (with smart functions: zoom, panning, etc.) plus instant alternative route visualization
X)	storage	None	Through web browser cache and cookies (one must take into account the legislation on cookies)	Personalization of service and web browser cache and cookies (one must take into account the legislation on cookies)		
Y)	Mobile devices supported	None	optimized web interface for mobile browser applications	Application or other high quality hardware specific interface for one mobile operating system (OS)	Application or other high quality hardware specific interface for most common mobile OSs	
Z)	User input form support	-	Input via several specific boxes	Input via single box with almost no degree of input faults tolerance	Input via single box with high degree of input faults tolerance without priorisation of best matches	Input via single box with high degree of input faults tolerance with priorisation of best matches and auto completion feature
	Legend: • Orange: minimum level of service • Green: optimum level of service • Grey: optimum is equal to minimum level of service					

Table 5: Level of service criteria for the usability of co-modal TIS

Besides the service level parameters the following table shows the level of quality.

Criteria	Level 0	Level 1	Level 2	Level 3
Accessibility	Not relevant			
Availability	Not guaranteed	Guaranteed to a minimum level	Guaranteed all the time	
Timeliness	Not guaranteed	Guaranteed to a time interval	In real time	
Update Frequency	Not defined	On a regular basis	As frequent as currently possible	
Information Quality Assurance	Not defined	Data from one or more sources – reliability not confirmed	Data from one or more sources – reliability confirmed	Collaboration from more than one source (data fusion) – reliability confirmed
Cross verified	No cross verification	Cross verification by one additional data source	Cross verification by more than one additional data source	
Accuracy (geographic)	Capable to describe for human readers only	Capable to machine code on main roads between major junctions (e.g. TMC)	Capable to machine code all roads with high level dynamic location referencing (e.g. TPEG Loc)	Capable to code all roads with precise location referencing down to 1 meter (e.g. OpenLR)
Forecast Horizon	Only current situation	Current situation and short time prediction	Current situation and short as well as long time prediction	

Table 6: Level of quality for co-modal traveller information services

It is recommended that users of these guidelines endeavour to implement traveller information which will advance the levels of services and levels of quality for those criteria shown in Table 2 - Table 6.

The criteria A, B, C and D are defined in the "Traveller Information Services, REFERENCE DOCUMENT, TIS Deployment Guideline Annex, chapter 5".

3 Part B: Supplementary Information

The EasyWay Deployment Guidelines contain two main elements:

- *Part A elaborates on the content of the ITS service addressed, describing the entire deployment framework including Requirements and Levels of Services.*
- *Part B is an appendix of informative content. Its objective is to illustrate part A with examples and feedback from deployments in the field.*

Part B is a lively chapter – in contrast to Part A, which by nature should be stable for a certain time – and subject to continuous development and update. The focus of Part B lies on national practices and experiences which, as cross-fertilisation material, can benefit any road operator in Europe and which are documented in Chapter "3.1 Best Practice" consisting of two main sections:

Examples of deployment 2010 - 2012

This section consists of contributions delivered by those EasyWay-Partners that have actively participated in the development and editing of the EW Deployment Guidelines 2012. Against this background, the examples - in detail listed in Chapter "3.1.1 Examples of deployments 2010 - 2012" – reflect the state of the art at the end of the year 2012. As such they delivered the basis for the discussion of the EW-deployment guideline development process and the setup of Part A "Harmonization requirements" at this point in time. But this means also that no direct relation or compliance to the harmonization requirements of Part A (as they are listed in the Compliance checklists in Annex A) can be assumed for these examples. Nevertheless, the given examples provide a concrete documentation of the state of the art at that time and in most cases, they can still be considered as current best practice.

EIP/EIP+ user and application survey 2013 - 2015

In trying to keep Part B up-to-date, the EasyWay follow up project EIP (European ITS Platform) – launched in 2013 – started two phases of activities to contribute to Part B by collecting user as well as application experiences (both technical and organisational) of national deployments that applied or at least considered the EW-DG 2012:

- *In the time period from the beginning of 2013 to the end of 2014, the EIP work programme provided essential post-processing steps to improve the usability of the DGs in ITS deployments and further to reflect the initial experiences and feedback gained with the guidelines since their release at the end of the year 2012.*
- *In 2015, the EIP+ work programme contained a follow-up activity with the goal to monitor and collect feedback on the application of the DGs in the five European ITS Deployment Corridor projects and to consolidate reporting of the results, lessons learned and best practices concerning the DG practicability and the compliance with the DG requirements on a European scale.*

The results of those two activities are based on responses on questionnaires which were circulated to national ITS deployment experts and European ITS corridor projects and finally are reflected in Chapter "3.1.2 EIP/EIP+ user and application survey 2013 - 2015".

3.1 Best Practice

3.1.1 Examples of deployment 2010 - 2012

3.1.1.1 Germany - co-modal service “Bayerninfo”

Service name	Bayerninfo
Operator	Public-Private-Partnership between the Bavarian Ministry of interior and the Bavarian Traffic Information Agency (VIB) **Contact:** Superior Construction Authority at the Bavarian State Ministry of the Interior Contactperson: Michael Müller Winzererstr. 43 80797 Munich, Germany **Operating company:** VIB Verkehrsinformationsagentur Bayern GmbH CEO: Dr. Gerhard Ploss, Managing Director: Uwe Strubbe, Thomas Lottner Contact Uwe Strubbe Fax: +49 (89) 9221-2763 E.Mail:uwe.strubbe@siemens.com Dr. Gerhard Ploss Fax: +49 (721) 9651-599 E-Mail: Gerhard.ploss@ptv.de Thomas Lottner Fax: +49 (89) 9221-2763 E-Mail: Thomas.lottner@siemens.com **Coordination of technical operation and maintenance** PTV AG Stumpfstraße 1 D-76131 Karlsruhe, Germany
Country/Region	Germany, Bavaria
Web-Address	http://www.bayerninfo.de
Short service description	
Objectives of Bayerninfo: • mobility - secure, effective and environmentally friendly • information - Bavaria wide, fast and transport mode comprehensive • networking - individual transport, public transport and cycling Facts & figures of Bayerninfo: • road network - 193.000 km	

• bicycle and pedestrian network - 53.500 km • railway network - 7.500 km • long distance cycle routes - 8.700 km (111 routes) • public transport - 30 transport associations with 41.500 stops • POI - 57.000 Points of interest • address data - 3.1 Mio single house coordinates
Geographical reference model
INTREST (inter-modal referencing system for traffic-related data) Very comprehensive and open system. Has been developed on behalf of the free state of Bavaria from different companies. The data model and the description of the interface are available in German. The commercial map of NAVTEQ is the basis of geographic information in INTREST. This data will be extended accordingly for the purposes of inter-modal services and thus INTREST is more detailed than commercially available graphs. That is mainly important for the walking and cycling routes.
Protocol for data exchange and interconnecting databases
The interface for the data integration into INTREST has been specified. This includes the protocol to be used as well. The documentation of the interface and the protocol to be used is available in German.
Data model
INTREST (inter-modal referencing system for traffic-related data) Besides the geographical reference model, INTREST also defines the data model for a variety of traffic-related data
Data format
.idf - INTREST specific data format (the format description is open and available in German)
User interface - common look & feel
The inter-modal service www.bayerninfo.de has developed its own user interface. The service is running since the end of the 1990's and has been steadily analysed and improved. In 2009 a user group test has been made to identify improvement possibilities concerning the user interface

3.1.1.2 Austria - co-modal service “A nach B”

Service name	A nach B
Operator	ITS Vienna Region Verkehrsverbund Ost-Region (VOR) GmbH MariahilferStraße 77-79, 4.Stock A-1060 Wien Phone: +43 1 581 30 60 Mail: office@its-viennaregion.at Web: www.its-viennaregion.at
Country/Region	Federal states Vienna, Lower Austria and Burgenland
Web-Address	http://www.anachb.at
Short service description	
AnachB.at is the new traffic service homepage for the Vienna Region developed by ITS Vienna Region. ITS	

Vienna Region was founded in the year 2006 as a cooperative traffic management project by Vienna, Lower Austria and Burgenland. AnachB.at service is:

- permanently updated
- for all traffic modes (also combinations of different modes)
- with realistic travel time
- free for the public
- for the entire Vienna Region

Geographical reference model

GIP - Graph Integration Platform

ITS Vienna Region uses the common network reference system GIP (Graph Integration Platform) as a base map for the system. The GIP is a geographical information system application that is focused for the requirements of public administration and e-government. The GIP is constantly updated by the governments and road administrations. Special E-government applications have been developed to make the results of administrative procedures automatically available for traffic management and traffic information. The network graphs for the routing applications (public transport, car traffic, FCD, trip planner …) come directly from the GIP and use common ID-numbers. The GIP is in productive use in the eastern provinces of Austria. The other provinces will bring their data into the GIP data structures by mid 2011.

Protocol for data exchange and interconnecting databases

ITS Vienna Region integrates more than 100 different types of input data. Wherever available standard protocols for data exchange are used such as Datex II, VDV 454, GML, TMC and OGC WFS, WMF. For fast and efficient data exchange special protocol extensions have been developed to meet the strict time requirements of online traffic information. All data is referenced to the GIP network. A standardised service interface has been developed in the In-Time project.

Data model

The network data is harmonised in the GIP networks by the governmental organisations beforehand. The public transport schedules are provided by the public transport association of the Vienna Region, using the same reference system. The different online data sources are immediately used in the calculation models and service platform for traffic information and traffic management. Later the online data and the results of the models are stored in a traffic data archive. That traffic data archive is used by the governmental organisations and administrations for traffic planning and by ITS Vienna Region for model calibration and quality management.

Data format

According to the different data types and purposes different data formats are in use. All geographic data is stored in the GIP, which uses a documented schema in a SQL-Database. The export of the routing network uses the IDF-Format that has been developed by the INTREST project in Bavaria. For the service interface standard formats are used (Datex II, WMF, WFS, XML, …) whenever these formats can provide the necessary performance.

User interface - common look & feel

ITS Vienna Region provides AnachB.at via the WWW (http://AnachB.at) and as an IPhone-App. The service interface of ITS Vienna Region provides the routing service to other information portals via a standardised interface. The traffic information is integrated in the city map of the city of Vienna (wien.at) and in the traffic portal of the national road administration ASFINAG Roadpilot. The routing service is also used for city logistic purposes.

3.1.1.3 England - co-modal service “Transport for London”

Service name	Transport for London
Operator	Transport for London
Country/Region	Great Britain, London
Web-Address	http://www.tfl.gov.uk
Short service description	
The Journey Planner is the co-modal door-to-door tip planner for the Greater London region: • combined connections with public transport and footpaths • bicycle routes • permanently updated • for all public transport modes (Rail, DLR, Tube, Bus, Coach and River) • with realistic travel time for London river service • free for the public • Dynamic generated stop specific timetables • live travel news and departure boards are available • Usage: f.e. march 2010: 60 million trips calculated	
Geographical reference model	
The underlying geographical reference is the database from NAVTEQ completed and merged with data about footpaths, bicycle routes and public transport.	
Protocol for data exchange and interconnecting databases	
Data exchange is done by manual exchange.	
Data model	
The data model consists also of links and nodes with traffic related attributes, which builds up an integrated network for all traffic modes. The data model is called “DIVA GIS”. It is the same that underlies the Vienna project AnachB and the Bavarian BayernInfo in the server level.	
Data format	
MIF (MapInfo Interchange Format) and DIVA GIS. MIF is documented for public access.	
User interface - common look & feel	
Own development of user interface, the service is running since august 2002 and is extended permanently	

3.1.1.4 United Kingdom - co-modal service “Transport Direct”

Service name	Transport Direct
Operator	public-private-partnership (consortium led by Atos Origin, UK Department for Transport, Welsh Assembly Government, Scottish Government)
Country/Region	Great Britain
Web-Address	http://www.transportdirect.info

Short service description
• door-to-door trip planner also in addition including flight • live travel news and departure boards (train, airport and bus) are available. • combined connections with public transport and footpaths and car • permanently updated • for all public transport modes. • free for the public • covering the south east of Great Britain
Geographical reference model
The underlying geographical reference is the database from NAVTEQ completed and merged with data about footpaths, bicycle routes and public transport.
Protocol for data exchange and interconnecting databases
Data exchange is done by manual exchange.
Data model
The data model consists also of links and nodes with traffic related attributes, which builds up an integrated network for all traffic modes. The data model is called “DIVA GIS”. It is the same that underlies the Vienna project AnachB and the Bavarian BayernInfo in the server level.
Data format
MIF (MapInfo Interchance Format) and DIVA GIS. MIF is documented for public access.
User interface - common look & feel
Own development of user interface, the service is running since 2006 and is extended permanently.

3.1.1.5 Denmark - Regional multimodal traveller information portals

Service name	Regional multimodal traveller information portals
Operator	Vejdirektoratet / Danish Road Directorate Contact: Charlotte Holstrøm, ch@vd.dk Contact for service description: Christian von Huth, crvh@vd.dk
Country/Region	Denmark – Greater Copenhagen, Trekanten, Eastern Jutland and Northern Jutland
Web-Address	www.trafikken.dk/hovedstaden www.trafikken.dk/trekanten www.trafikken.dk/østjylland www.trafikken.dk/nordjylland
Short service description	
The four internet based co-modal traveller information portals provide the travellers in Denmark with a good overview of the transport system in four areas of Denmark. They provide real time travel information for all the transport modes that are gathered on the portals. The partners comprise the national road administration, the municipalities, the police and all actors within the public transport. In 2009, www.trafikken.dk/hovedstaden won an EasyWay Award for best end-user information project. The ITS system has been in operation since 2007 and was implemented before the Deployment Guideline 2010 (Start 2006; End 2007). **Lessons learnt / factor of success**: • Technical o A core challenge is data quality and updating of data • Institutional/organisational o The organisation with all actors involved requires a lot of effort to build up and maintain/continue **Impacts assessment / results** • Please contact Christian von Huth for new information: crvh@vd.dk	
Geographical reference model	
No information	
Protocol for data exchange and interconnecting databases	
No information	
Data model	
No information	
Data format	
XML or RSS	
User interface - common look & feel	
No information	

3.1.1.6 Hungary - co-modal service "www.utvonalterv.hu"

Service name	utvonalterv.hu - multimodal and intermodal traffic webportal
Operator	Topolisz Ltd Contact: Vera Siegler- managing director
Country/Region	Hungary (+Romania)
Web-Address	www.utvonalterv.hu

Short service description

A multimodal and intermodal route planner connects different traffic modes that describe an optimal traffic chain. In order to achieve this integration, the various types of data - gathered from different sources - need to be converted and checked in term of consistency, logical structure and content. www.utvonalterv.hu, the Hungarian traffic portal pays attention to simple, clear, handy user interface while applies authentic, valid and precise databases. The huge amount of data - from map data to different time tables, from static data to dynamic data - are converted to a special database format for the sake of supplying a real time solution for the route planner software.

Content and service platform

Data elements:

- map data – source: map provider Top-Map Ltd (private)
- navigation database for individual traffic- car, bicycle, taxi, walking – source: map provider Top-Map Ltd
- POI's – source: poi content provider companies
- timetables, public transport network – source: public transport companies, operators (Budapest, major cities local, railway, coach)
- TMC – source: TMC provider TrafficNav Ltd. (private)
- other – photos, camera viewing

Multi modal functions:

- car, taxi, pt (local, long-distance coach, railway),bicycle, walking

Inter modal functions:

- for example: walking/cycling->PT stop->local PT->walking/cycling RW/coach station->long-distance PT->taxi .....

Organisational requirements, stakeholders:

- Different data provider companies (private or state, local government, PT companies) mainly for static data
- Users community – reporting the changes via map editor, report portal, emails,
- Mobil operators and users community for automatic FCD data
- Dynamic data from different traffic centres, operators
- Dispatcher centre collecting, checking and converting data coming from different source in different format with different frequency
- Technical staff for operation (hardware, software, database, etc.)
- Call centre for individual user problems – optional

Technical requirements

- Map server with capacity serving two hundred thousand users per day, adequate bandwidth, reliable service provider

Lessons learnt / factor of success:

The traffic service is very popular among the users, about 70-80K users/day, more than 1 million download/day. Free of charge, income origin from advertising. The income is less than the costs for technical and operational requirements. The owner company has secondary advantage having this portal (special orders in the subject).

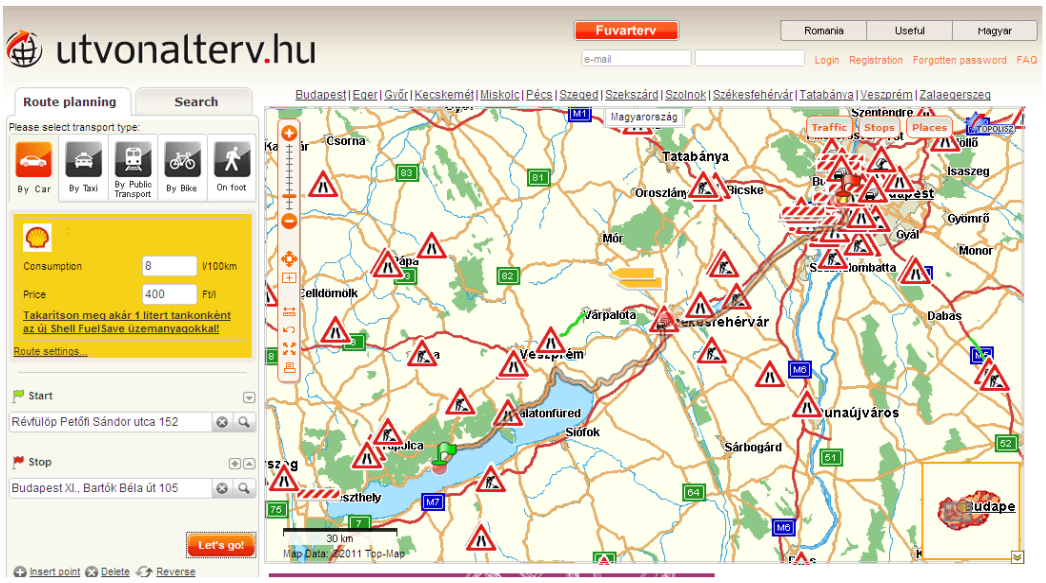
The key to success is the continuously fresh and authentic data, to which needs a staff, good technical and personal connection to traffic centres and operators, a lot of enthusiastic user, good technology for data conversion and data processing.

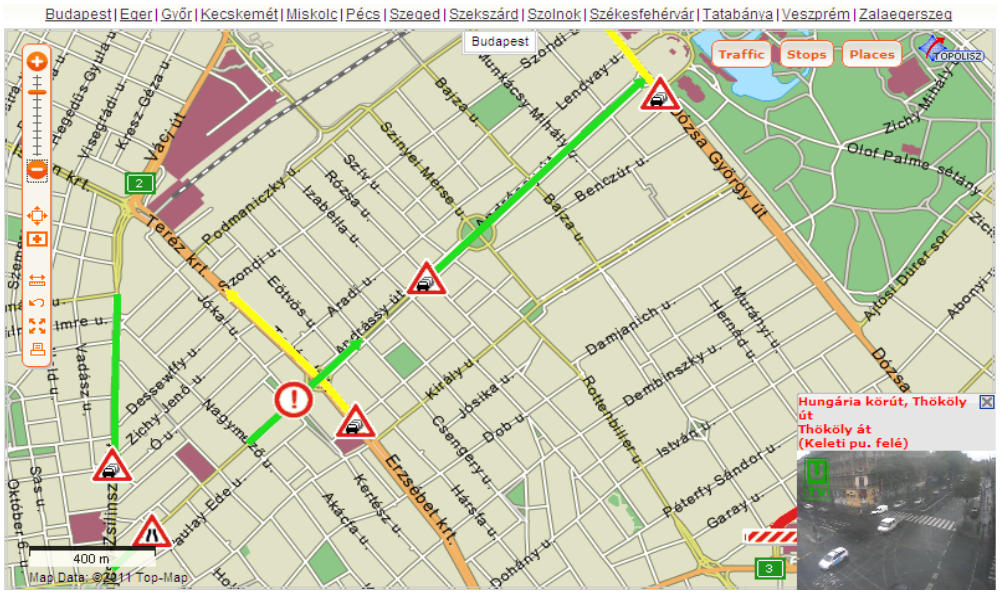
Impacts assessment / results

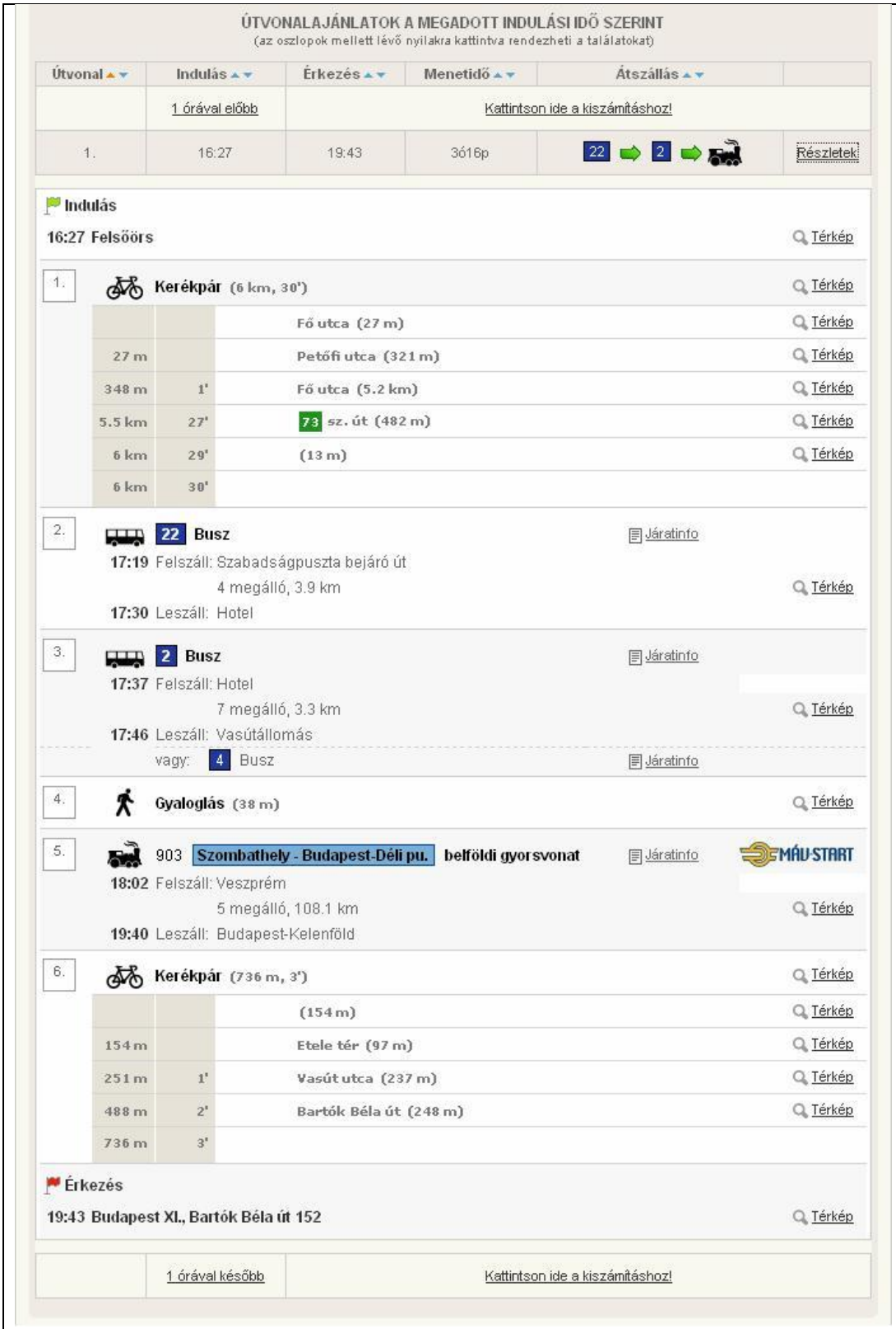
Evaluation 2007-2009. The key evaluation results are:

- Traveller awareness of the service: After one year and two months 32 % of the target group (total appr. 1.5 million people) had heard about the existence of the portal.
- Web site visits: Less than expected with 261.000 visits the first year.
- Users: Many of the users (60 %) use the site as a tool in their daily life and visit one or several times a week. The users are content with the information and find it relevant. They are willing to change their behaviour and they also do so to a much larger degree than expected.
- Dissemination: 3 out of 4 radio stations use the web site for traffic announcements. Furthermore the site is used by the TV-stations TV2 News etc. This means that the information provided is widely disseminated through other channels than the Internet

Illustrations:




Budapest | Eger | Győr | Kecskemét | Miskolc | Pécs | Szeged | Szekszárd | Szolnok | Székesfehérvár | Tatabánya | Veszprém | Zalaegerszeg
Budapest
Traffic
Stops
Places
TOPOLIS2
Hungária körút, Thököly út
Thököly át
(Keleti pu. felé)
400 m
Map Data: ©2011 Top-Map



ÚTVONALAJÁNLATOK A MEGADOTT INDULÁSI IDŐ SZERINT
(az oszlopok mellett lévő nyilakra kattintva rendezheti a találatokat)

Útvonal	Indulás	Érkezés	Menetidő	Átszállás	
	1 órával előbb	Kattintson ide a kiszámításhoz!			
1.	16:27	19:43	3ó16p	22 → 2 →	Részletek

Indulás
16:27 Felsőörs Térkép

1. **Kerékpár** (6 km, 30') Térkép

		Fő utca (27 m)	Térkép
27 m		Petőfi utca (321 m)	Térkép
348 m	1'	Fő utca (5.2 km)	Térkép
5.5 km	27'	73 sz. út (482 m)	Térkép
6 km	29'	(13 m)	Térkép
6 km	30'		

2. **22 Busz** Járatinfo
17:19 Felszáll: Szabadságpuszta bejáró út
4 megálló, 3.9 km Térkép
17:30 Leszáll: Hotel

3. **2 Busz** Járatinfo
17:37 Felszáll: Hotel
7 megálló, 3.3 km Térkép
17:46 Leszáll: Vasútállomás
vagy: 4 Busz Járatinfo

4. **Gyaloglás** (38 m) Térkép

5. 903 **Szombathely - Budapest-Déli pu.** belföldi gyorsvonat Járatinfo MÁV-START
18:02 Felszáll: Veszprém
5 megálló, 108.1 km Térkép
19:40 Leszáll: Budapest-Kelenföld

6. **Kerékpár** (736 m, 3') Térkép

		(154 m)	Térkép
154 m		Etele tér (97 m)	Térkép
251 m	1'	Vasút utca (237 m)	Térkép
488 m	2'	Bartók Béla út (248 m)	Térkép
736 m	3'		

Érkezés
19:43 Budapest XI., Bartók Béla út 152 Térkép

1 órával később | Kattintson ide a kiszámításhoz!

Geographical reference model
No information
Protocol for data exchange and interconnecting databases
No information

Data model
No information
Data format
special database format
User interface - common look & feel
No information

3.1.1.7 Sweden - co-modal service "www.resrobot.se"

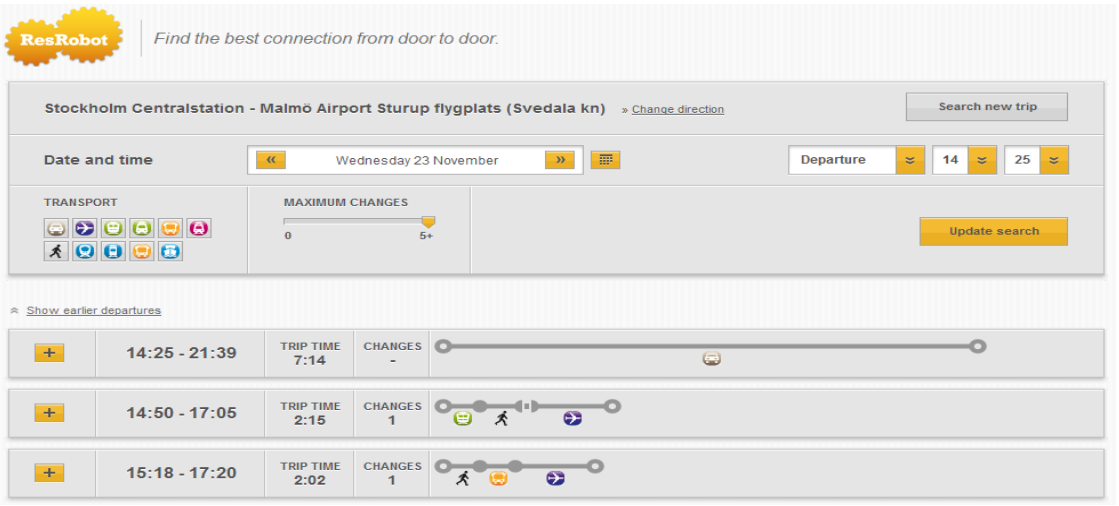
Service name	Co-modal travel planner/ ResRobot
Operator	Samtrafiken Contact: Clas Roberg, e-mail: clas.roberg@trafikverket.se
Country/Region	Sweden - TERN + all other, incl. rail networks (6097 km)
Web-Address	www.resrobot.se
Short service description	

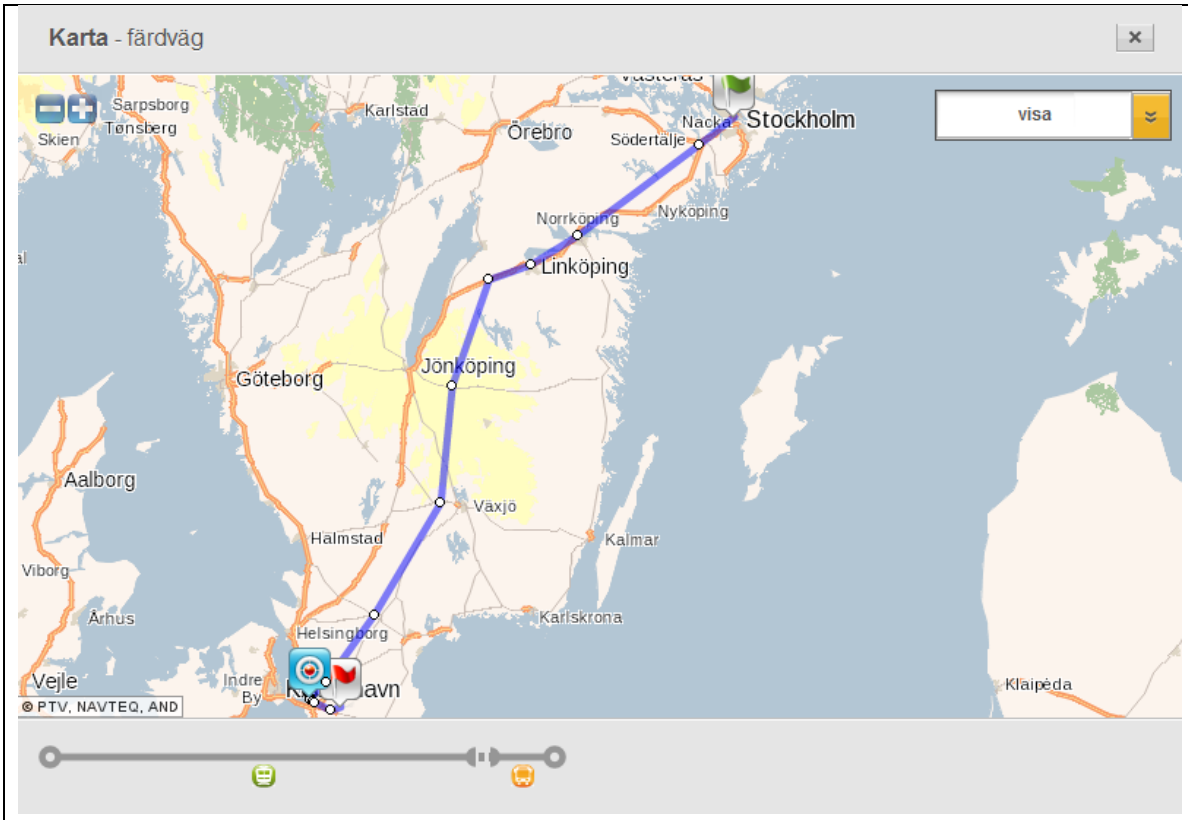
ResRobot is a national journey planner which includes all forms of transportation and detailed station information. About 50 000 stations can be found using Resrobot. The system includes 99% of all domestic public transport.

Start: 1/1/2006

End:12/24/2012

Illustrations:





Geographical reference model
No information
Protocol for data exchange and interconnecting databases
No information
Data model
No information
Data format
No information
User interface - common look & feel
No information

3.1.1.8 Sweden - co-modal service Trafiken.nu - Stockholm

Service name	Co-modal travel planner/ Trafiken.nu - Stockholm
Operator	Swedish Transport Administration, Stockholm PT, City of Stockholm Contact: JoakimBarkman, e-mail: joakim.barkman@trafikverket.se
Country/Region	Sweden - Three major regions in Sweden (Stockholm and uniform implementations in Gothenburg and Skåne region), TERN + all other, incl. rail networks, 3 Number of locations on the TERN

Web-Address	http://reseplanerare.trafiken.nu/bin/query.exe/en?

Short service description

The Trafiken.nu travelplanner is a regional journey planner which includes all forms of transportation incl. bicycle and walking. The focus is the commuter perspective while not competing with private service providers.

Requirements specification:

Requirements extracted from a pre study based on previous work on travel time project STRESS and PT co-modal travel planner projects. Extensive investigation of GUI requirements conducted by postgraduate.

Lessons learnt / factor of success:

Quality and accessibility of digital infrastructure (transport network, especially for biking and walking) is crucial. One factor of success in the Stockholm project was the identification of bottle necks to be incorporated in the journey planning

Impacts assessment / results

A study of the impact is being conducted but is not yet ready to be presented.

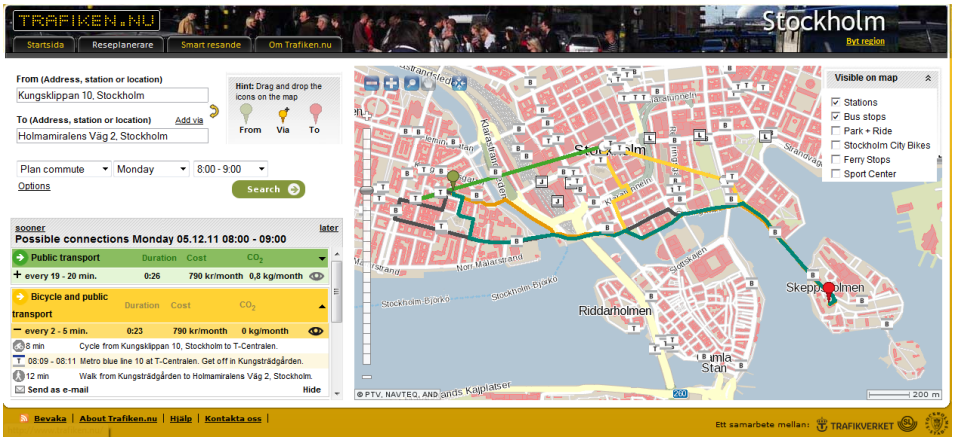
Documentation available on the project:

Title: Reseplaneraren__rapport_ver 1.0.pdf

Contact: JoakimBarkman, e-mail: joakim.barkman@trafikverket.se

Language: Swedish

Illustrations:



Geographical reference model

No information

Protocol for data exchange and interconnecting databases

No information

Data model

No information

Data format

No information

User interface - common look & feel

No information

3.1.1.9 Austria - co-modal service "Verkehrspilot"

Service name	Verkehrspilot
Operator	ASFINAG, ÖBB, Austro Control Contact: Martin Müllner
Country/Region	Austria - High Level Roadnetwork; 2175 km
Web-Address	http://www.verkehrspilot.at

Short service description

The aim of this co-operation is to provide real time information on door-to-door connections using all three means of transport. Using this new service you are enabled to plan journeys in and to Austria as concerns different means of transport (railway, bus, car, aircraft).

Start: 11/29/2007

End:5/9/2008

Lessons learnt / factor of success:

More focus on the HMI and the interaction with the end user. The promotion of the possibilities of the Verkehrspilot towards the end user is essential.

Impacts assessment / results

Verkehrspilot is a technical pilot where no assessment activities in the mentioned categories have been done.

Illustrations:

Geographical reference model

No information

Protocol for data exchange and interconnecting databases

No information

Data model

No information

Data format
No information
User interface - common look & feel
No information

3.1.2 EIP/EIP+ user and application survey 2013 - 2015

3.1.2.1 Results “Concept and Practicability” questionnaire

One corridor project responded to the questionnaire. From this no clear image of the practicability of the DG can be concluded. However the domain and topic of co-modal traveller is one of the most dynamic ITS applications – proven by the considerable number of presentations in the EIP Forum - and with the upcoming regulation on multi-modal journey planners and respective data sources likely to undergo a major framework change. However this regulation does not address the same aspects as the DG (notably not the look & feel of services nor their organisational background).

3.1.2.2 Results "Compliance checklists" questionnaire

All "must" and “should” requirements were fulfilled in all implementations (if applicable) and there were no deviations reported.

3.1.2.3 New best practice examples of deployment 2013-2015

Many of the existing best practice examples have been evolved, increasing their scope, coverage or means of communication and distribution. Also the services profit from progress in the standardisation of basic data and the access to it.

It is recommended to make the feedback on the deployment guideline obligatory for future projects. This is even more beneficial as the next feedback phase will have to take into account the upcoming regulation on multi-modal services and a comprehensive update seems likely.

3.2 Icons for use in maps

The following Icons can be retrieved as vector graphics from the DG coordinators. The icons have been developed in connection with the sophisticated co-modal traveller information service www.bayerninfo.de.

3.2.1 Icon set for travel information POIs in maps

Yellow marked icons stand for specific German illustrations which might not fit to function as an example for one common European icon. For these icons common European icons have to be developed.

Rack Railway

Taxi

Suburban Train (German icon, an European icon has to be developed)

Underground railway (German icon, an European icon has to be developed)

Car

Bus

Bicycle

Pedestrian

Museum Train

Public Transport (German icon, an European icon has to be developed)

Regional Train

Ship

Cable Car

Start or route

Destination

Tram

Via-point of route

Through Connect

3.2.2 Icon set for public institution POIs in maps

Public

University

Police

Fire brigade

Health

Institution of society

Religious institution

School

Kindergarten

Administration

3.2.3 Icon set for food and beverage sector POIs in maps

Restaurant

Small gastronomy

Winery

Pub

Nightlife

Bar

Ice cream parlour

Disco

Café

Beer garden

Snack bar

Cottage

3.2.4 Icon set for tourism POIs in maps

Tourism

Architectural sight

Park

Zoo

Amusement park

Information

Natural monument

Panorama road

Mine

Viewpoint

3.2.5 Icon set for culture and entertainment POIs in maps

Entertainment and culture

Museum

Cinema

Event location

Casino

Library

Gallery

Opera

Stage

Concert hall

Theatre

3.2.6 Icon set for accommodation POIs in maps

Accommodation

Camping

Lodging

Youth hostel

Hotel

3.2.7 Icon set for sports and leisure times POIs in maps

Sports

Swimming pool

Tennis

Golf course

Bowling

Ski

Ice sports / skating facility

Playground

Sport airfield

Marina

Beach-volleyball

Hiking

Cross-country skiing

Alpine skiing

Bicycle

Football

Sports centre

3.2.8 Icon set for shopping and provisioning of services POIs in maps

Service

Trade fair

Bakery

Hairdresser

Hot Spot

Pharmacy

Shopping

Car repair

Bank

Post Office

Telephone

Health

3.2.9 Icons to illustrate traveller information in message lists or maps

The following Icons can be retrieved as vector graphics from the DG coordinators. These icons have been also developed in the project www.bayerninfo.de.

Motorway

End of motorway

Railway station

Mountain railway

Lane closed

Attention

Special weather conditions / rain

Special weather conditions / snow, ice

Special weather conditions / fog

Airport

Heavy traffic

Special weather conditions / wind

Road charge

Public transport stop logo

Ferry

Car park

Measuring point for traffic

Car-info, event, service (parking), service (gas station)

Road closure

Parking space

Park & Ride

Congestion

Intersection closure

Suburban train icon

Federal road appellation

stop-and-go traffic

Truck closure

Closed gas station

European road appellation

Motorway appellation

Technical problem railway

Taxi parking area

Gas station

Accident

Transport

Technical problem traffic lights

Waiting time

Accident / fire

Underground icon

Weather / rain

Waiting time trucks

Traffic forecast

Industry

Weather forecast

Weather

3.3 Business Model

3.3.1 Stakeholders in Service Provision

Please see chapter 2.3

3.3.2 Cost / Benefit Analysis

Co-modal services are very complex and provide comprehensive traveller and road user information. Yet no substantial cost / benefit analyses exist.

4 Annex A: Compliance Checklist

4.1 Compliance checklist "**must**"

#	Requirement	Fulfilled?		If no – quote of insurmountable reasons
		Yes	No	
Functional requirements				
FR1	Co-modal TIS **must** be based on a common or at least interoperable geographical reference model to be able to integrate different data sources which most likely use different location referencing methodologies and thus come to a common location referencing denominator.			
Organisational requirements:				
OR2	Business models could be influenced by commercial considerations which might lead to a preference of specific transport modes/means or other information content. This is one important reason that co-modal services **must** reflect a comparison of modes/means of transport not biased due to commercial motives. Note: Co-modal services aiming towards reducing car use may integrate only some functionality dedicated to car transport. In this case unbiased comparison is not relevant.			
Technical requirements				
None				
Common Look & Feel requirements				
None				
Level of Service requirements				
None				

4.2 Compliance checklist "**should**"

#	Requirement	Fulfilled?		If no – explanation of deviation
		Yes	No	
Functional requirements				
FR2	Co-modal TIS content and service platform **should** be based on a harmonised data model for each service feature. Service developer **should** orient the data model on already existing best practices (s. chapter 2.4.2) as yet no common standard exists.			
Organisational requirements				
OR3	Basic co-modal services according to A1, A2, A3 and A4 **should** be free of charge and non-commercial. Advertising respectively financing concepts with participation of the private sector are allowed as far as it is under public control and it does not lead to a preference of any specific transport mode or means of transport. **Note**: In some EasyWay Member States the public sector is not involved directly in the service provision but is compiling and maintaining a transport information data base, which the private service providers (A5) may use in any way they wish. In such cases the public sector supports private services (A5) by maintaining all or part of the data bases utilised by the services, but has no other role in service provision.			
OR6	Co-modal service providers **should** take into consideration the ITS action plan as where co-modality is among the priority issues identified by the EC.			
OR7	Co-modal service providers **should** take into consideration the ITS directive (2010/40/EU) when developing services.			
Technical requirements				
TR1	Co-modal services **should** offer information for public transport, car transport and usually also for pedestrian and bicycle transport			
TR3	Co-modal services **should** be based on transport mode comprehensive system requirements (see points 1-3 in chapter 2.4.1)			

TR4	Co-modal services **should** use and choose the best fitting standards and if no suitable standards exist the services should be inspired from initiatives. The standards and initiatives are listed under chapter 2.4.2. The list under 2.4.2 is not exhaustive and other standards which are already widely used can be also used.			
Common Look & Feel requirements				
CL&FR1	Co-modal services **should** take into consideration the requirements for colour blind and other visually impaired people as far as possible			
CL&FR3	Co-modal services **should** use different colours to indicate the different means of transport in maps.			
CL&FR5	Icons **should** be in accordance with prevailing national road codes and where applicable be in line with the requirements of the EW-DG for Variable Message Signs Harmonization VMS-DG01: • MS which ratified the 1968 Convention MUST respect the 1968 Convention and SHOULD consider the Consolidated Resolution on Road Signs and Signals (R.E.2); • MS which did sign but not ratify the 1968 Convention SHOULD follow the 1968 Convention and also consider the R.E.2.			
CL&FR6	Icons **should** be categorized (e.g. in categories for travel information, public institutions etc.; see also example of categories under 0) and **should** follow a common colour scheme.			
CL&FR7	Icons **should** use internationally understandable designs and avoid country/region specific designs where possible/applicable			
CL&FR9	When co-modal services provide information on "bike and ride", "kiss and ride", "park and ride" and "car-share park and rides", they **should** use these service features as defined in chapter 2.5.4			

Level of Service requirements				
LoSR1	Co-modal TIS **should** reach the minimum (marked with orange or grey colour) level of service as shown in Tables 2, 3, 4 and 5 where any criteria (A)-(Z) is deployed as part of the co-modal TIS.			

4.3 Compliance checklist "**may**"

#	Requirement	Fulfilled?		If yes –remarks
		Yes	No	
Functional requirements				
None	.			
Organisational requirements				
OR1	The co-modal service **may** be organised according to the schemas A1, A2, A3 or A4 as shown in Figure 3.			
OR4	Under Chapter 2.6.2 the optimum and minimum LoS for co-modal TIS are defined. For the minimum LoS, reflecting also the basic service requirements, one **may** use the following organisational characteristics (following the schema and abbreviations of Figure 3): • Organisation of the TIS: **A.1, A.2, A.3 or A.4** • Obligations for TIS provision: **B.1** • Data used in the TIS: **C.1 or C.2** • Business model of the TIS: **D.1**			
OR5	Public transport operators **may** be obliged by contract to provide their data in a format that is useful and defined by the public authority. A catalogue of the information that must be provided is urgently needed. TAP-TSI may be a good blue print.			
Technical requirements				
TR2	Co-modal services aiming towards reducing car use **may** integrate only some functionalities of road transport.			
Common Look & Feel requirements				
CL&FR2	Co-modal services **may** use the colours for means of transport route indication as provided in chapter 2.5.2 as far as these colours have enough contrast to the map background information.			
CL&FR4	Co-modal services **may** use a common look & feel and colour scheme on the maps shown in the internet as well as for printed maps			
CL&FR8	Public transport icons for means of transport and public transport stops/stations **may** follow the local public			

	transport operators design			
CL&FR10	Co-modal services user input forms **may** follow already existing deployments. The input forms can contain input elements such as text fields, checkboxes, radio buttons and submit buttons for the user to complete.			
CL&FR11	Co-modal traveller information services do not necessarily provide a map presentation. They might offer routing information and / or traveller information besides maps in textual or a graphical way. This information provision **may** follow already existing services (see also chapter 3.1 for already existing services). The presentation of co-modal traveller information besides the map presentation **may** follow already existing deployments.			
Level of Service Requirements				
LoSR2	Co-modal TIS **may** reach the optimum (marked with green or grey colour) level of service as shown in Tables 2, 3, 4 and 5 where any criteria (A)-(Z) is deployed as part of the co-modal TIS.			

5 Annex B: Bibliography

- EasyWay Guideline for Traveller Information Services – Part A: summary document, version 1.0 December 2009
- Data model for co-modal traveller information services INTREST (www.intrest.org)
- ITS Action Plan of the European Commission, Brussels, 2008
- Directive 2010/40/EU of the European Parliament and of the Council (ITS directive)
- S. Bradner, (Network Working Group). Key words for use in RFCs to Indicate Requirement Levels. *The Internet Engineering Task Force (IETF).* [Online] March 1997. http://www.ietf.org/rfc/rfc2119.txt.