Traveller Information Services

CO-MODAL TRAVELLER INFORMATION SERVICES

Deployment guideline

TIS-DG07 | VERSION 01-02-00 | JANUARY 2012
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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 incl. pedestrian information, car and bicycle information.

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

Safet y

Efficiency

Environment

0

1

2

3
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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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>CEN</td>
<td>European Committee for Standardization</td>
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<tr>
<td>DATEXII</td>
<td>Data exchange specifications for traffic management and information</td>
</tr>
<tr>
<td>GDF</td>
<td>Geographic Data Files</td>
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<tr>
<td>GIP</td>
<td>Graph Integration Platform</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and communication technology</td>
</tr>
<tr>
<td>INTREST</td>
<td>Intermodal referencing system for traffic-related data</td>
</tr>
<tr>
<td>ISO</td>
<td>International Organization for Standardization</td>
</tr>
<tr>
<td>ITS</td>
<td>Intelligent Transport Systems</td>
</tr>
<tr>
<td>PT</td>
<td>Public Transport</td>
</tr>
<tr>
<td>SIRI</td>
<td>Service Interface for Real Time Information</td>
</tr>
<tr>
<td>VDV</td>
<td>Verband Deutscher Verkehrsunternehmen</td>
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<tr>
<td>VMS</td>
<td>Variable Message Signs</td>
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<tr>
<td>WWW</td>
<td>World wide Web</td>
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<tr>
<td>TMS</td>
<td>Traffic Management Services</td>
</tr>
<tr>
<td>TPEG</td>
<td>Transport Protocol Experts Group (standard)</td>
</tr>
<tr>
<td>UML</td>
<td>Unified Modelling Language</td>
</tr>
<tr>
<td>VMS</td>
<td>Variable Message Sign</td>
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1 Introduction

1.1 The concept of the EasyWay Deployment Guidelines

1.1.1 Preliminary note

This document is one in a set of documents created as part of the EasyWay project, a project for Europe-wide ITS deployment on main TERN corridors driven 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 ITS European 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 has started in 2007 and has established a huge body of knowledge and consensus for harmonised deployment of these ITS services. This knowledge has been captured in documents providing guidance on service deployment, the EasyWay Deployment Guidelines.

The Deployment Guidelines had started with their first iteration mainly capturing best practice. This supported service deployment in EasyWay very strongly by

- making EasyWay actors in deployment cognisant of the experiences made in other parts of Europe
- helping to avoid making errors others has already made
- speeding up deployment by highlighting important and critical issues to look at

Meanwhile, this best practice has successfully contributed to ITS deployments all over Europe, so it is possible now to take the logical next step and start actually 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. Besides this 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 have 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 in the scope of EasyWay. Thus, the content of this section is prescriptive by nature and EasyWay partners are expected to ensure that their deployments are compliant to the specifications in this section. Wherever concrete circumstances in a project do not allow fully following these recommendations, EasyWay partners are expected to provide a substantial explanation for the necessity 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. Such supplementary information may contained – but is 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 a mandatory requirement for every prescriptive document to provide specifications in a well-defined and unambiguous language. There are various specifications in the world of specifications that clarify the use of particular words in such 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 over the keywords, their meaning and the possible answers in the context of part A gives the following table. In general the keywords in brackets are possible, but not recommended to use, to avoid confusion, which could be originated as a consequence of different common linguistic usage of the terms in the different EU member states.

<table>
<thead>
<tr>
<th>Requirement wording</th>
<th>Meaning in RFC 2119</th>
<th>Meaning in EasyWay</th>
<th>Possible checklist answers</th>
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</thead>
<tbody>
<tr>
<td>MUST (REQUIRED, SHALL)</td>
<td>the definition is an absolute requirement</td>
<td>there may exist insurmountable reasons to not fulfill (e.g. legal regulations…)</td>
<td>fulfilled: yes or</td>
</tr>
<tr>
<td>MUST NOT (SHALL NOT)</td>
<td>the definition is an absolute prohibition</td>
<td></td>
<td>Fulfilled: no - explanation of insurmountable reasons</td>
</tr>
<tr>
<td>SHOULD (RECOMMENDED)</td>
<td>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.</td>
<td>The Definition is very close to a “MUST”, “MUST NOT” Meaning in EasyWay conform to RFC 2119</td>
<td>fulfilled: yes or</td>
</tr>
<tr>
<td>SHOULD NOT (NOT RECOMMENDED)</td>
<td>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</td>
<td></td>
<td>Fulfilled: no - with explanation</td>
</tr>
<tr>
<td>MAY (OPTIONAL)</td>
<td>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</td>
<td>Meaning in EasyWay conform to RFC 2119</td>
<td>fulfilled: yes - with explanation or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fulfilled: no</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Part A - requirement wording

Note: the capitalisation of these keywords that is frequently used in Internet 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:

**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. The geographical basis **may** be left to the operator to define.

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. “Advises” are 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:

**Advice**

**FA1:** Loremipsumdolor sit amet, consetetursadipscingelitr, ...
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 incl. pedestrian information, car and bicycle information.

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 "background 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 – background 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 background system combines different data sources.

Co-modal traveller information services - frontend:

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 “Incident Warning”)

Internet portals 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 information directly either
  o by on-the-fly calculation on decentralized systems.
  o 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. Also dedicated information can be given, e.g. for freight traffic.
In the past years the former separation of pre-trip and on-trip services had been massively 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 are the Missions?

As co-modal traveller information services offer the road users and travellers comprehensive information on alternative routes and means of transport these services are predestined to lead to a more efficient network operation as well as a better utilization of the transport infrastructure. Together with the service potential to foster a modal shift towards reputed more environmental-friendly modes/means of transport co-modal services contribute to the EasyWay objectives of improving mobility and greening transport by reducing its environmental impact.

Not only these general service outcomes are of high importance but also the fact that end users are better informed and thus experience a facilitation of their mobility needs.

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).

Co-modal traveller information services are comprehensive and not just integrate but also combine a variety of many different traveller information services (e.g. real time event and warning services, traffic condition information, public transport information, travel time information etc.). This service variety leads to many different technical solutions. And exactly the existence of many different technical solutions makes it very difficult to formulate concrete service requirements which must, should or may be followed. Such vague requirements leave space for interpretation but still are of high added value in the sense of harmonisation. Besides these more vague service requirements the deployment guideline also includes concrete requirements especially to fulfil a common look & feel for co-modal services.

1.2.1.5 Distinction to 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.
• 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 must compare the travel times for the different means of transport in a fair way. All travel times must 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.

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 01-02-00”, Chapter 2.2 “Contribution to EasyWay Objectives”.

The graph below provides a quantification of the service added value 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 and are described in chapters 1.2.2.2, 1.2.2.3 and 1.2.2.4.

![Service radar graph](image)

Figure 1: Co-modal traveller information service radar

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 State of the art

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 highly sophisticated services exist across 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
- 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 incl. pedestrian information, car and bicycle information.

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.

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.

![Functional and information architecture of co-modal information services](image-url)

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 must use most common data formats for data exchange and interconnecting different databases of different data sources. Most common data formats means that service developer must orient on already existing best practices (s. chapters 2.4.2 and 3.1).
- **FR3**: Co-modal TIS content and service platform must be based on a harmonised data model for each service feature. Service developer must orient the data model on already existing best practices (s. chapters 2.4.2 and 3.1) as yet no common standard exists.
- **FR4**: Co-modal TIS must follow the common look & feel principles (requirements) as described in chapter 2.5.

2.3 Organisational Requirements

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

![Organisational characteristics of co-modal traveller information services](image)

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 should 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:

- OA1: 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 an unbiased comparison of modes/means of transport.
- 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.

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 0 the optimum and minimum LoS for co-modal TIS are defined. For the minimum LoS, reflecting also the basic service requirements, the recommended organisational characteristics (following the schema and abbreviations of Figure 3) are the following:
  - 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
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 **should** 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 is 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 **must** 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 **must** take into consideration the ITS directive (2010/40/EU) when developing services.
2.4 Technical Requirements

2.4.1 Required ICT Infrastructure

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

1) **Road transport requirements**
   - Traffic and road data-collection
   - 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 must integrate road transport data, public transport data and must be based on transport mode comprehensive system requirements (s. point 1-3 in chapter 2.4.1)

The availability of www technology and sufficient (broadband) connectivity is a basic requirement for most background 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:**
• Interoperable data models for co-modal networks
  o INTREST
  o GIP
  o GDF (just road network)

• Interoperable data formats for dynamic location referencing with the focus for individual transport content:
  o OpenLR
  o AGORA-C
  o TPEG-Loc

• Interoperable content modelling (data model, format and protocol) with road transport focus for dynamic data:
  o DATEXII
  o TPEG
  o TMC

• Interoperable content modelling (data model, format and protocol) with public transport focus for dynamic data:
  o VDV-453
  o VDV-454
  o SIRI

• Protocol and method to connect two PT routing systems
  o DELFI

• Standardized protocols and methods to transfer map data and additional map information:
  o WMS (Web Map Service) / WFS (Web Feature Service)

Technical requirement:

TR2: Co-modal services should use and choose the best fitting standards and if no suitable standards exist the services should follow initiatives. The standards and initiatives are listed under chapter 2.4.2.

2.5 Common Look & Feel

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 to Google Maps navigation. 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.

2.5.1 Illustration of co-modal routing information on maps

The colours for the route indication in maps should 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 must take into consideration the requirements for colour blind and other visually impaired people as far as possible
• CL&FR2: Co-modal services should use the colours for means of transport route indication as provided in chapter 2.5.1 as far as these colours have enough contrast to the map background information.
• CL&FR3: Co-modal services must use different colours to indicate the different means of transport in maps.
• CL&FR4: Co-modal services must use a common look & feel and colour scheme on the maps shown in the internet as well as for printed maps

2.5.2 Icons to illustrate the different map contents

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.

• 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.
- Icon set for public institution POIs in maps
  - Public
  - University
  - Police
  - Fire brigade
  - Health
  - Institution of society
  - Religious institution
  - School
  - Kindergarten
  - Administration

- Icon set for food and beverage sector POIs in maps
  - Restaurant
  - Small gastronomy
  - Winery
• Icon set for tourism POIs in maps

- Pub
- Nightlife
- Bar
- Ice cream parlour
- Disco
- Café
- Beer garden
- Snack bar
- Cottage

- Tourism
- Architectural sight
- Park
- Zoo
- Amusement park
- Information
- Natural monument
- Panorama road
- Mine
- Viewpoint

• Icon set for culture and entertainment POIs in maps

- Entertainment and culture
- Museum
- Cinema
- Icon set for accommodation POIs in maps
  - Accommodation
  - Camping
  - Lodging
  - Youth hostel
  - Hotel

- 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
• Icon set for shopping and provisioning of services POIs in maps

Common look & feel requirement:

• **CL&FR5:** Co-modal services should use the icon-sets as provided in chapter 2.5.2 (besides the yellow marked icons). Further icons are possible but these have to be communicated in advance to the DG coordinators and should follow the same icon design and colour scheme.
2.5.3 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](http://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
Common look & feel requirement:

- **CL&FR6:** Co-modal services *should* use the icon-set as provided in chapter 2.5.3. Further icons are possible but these have to be communicated in advance to the DG coordinators and *should* follow the same icon design and colour scheme.

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 park+ride car parks and transfer to the public transport system or carpool for the rest of their trip. Park+ride 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&FR7**: Co-modal services must understand their service features as defined in chapter 2.5.4

2.5.5 Input mask as basis for co-modal route information requests

Common look & feel requirement:

- **CL&FR8**: Co-modal services input masks must be oriented on already existing deployments (see chapter 3.1)

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

Common look & feel requirement:

- **CL&FR9**: The presentation of co-modal traveller information besides the map presentation must be oriented on already existing deployments (see chapter 3.1).
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 http://www.easyway-its.eu/document-center/document/open/490/ and download the Guidance for Classifying the EasyWay Network into OE ver 1.0.

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 (s. chapter 0) in connection to each EasyWay Operating Environment. The expected minimum and optimum LoS can be found in chapter 0.
2.6.2 Level of Service Criteria

2.6.2.1 Level of Service requirements

Level of service requirements:

- **LoSR1**: Co-modal services must at least reach the minimum level of service (marked in orange or grey colour) of the criteria in Table 2, Table 3, Table 4 and Table 5 as far as the service offers the service criteria. The minimum level of services has been identified in an expert view and is not based on scientific analysis.

- **LoSR2**: Co-modal services should reach the optimum level of service (marked in green or grey colour) of the criteria in Table 2, Table 3, Table 4 and Table 5 as far as the service offers the service criteria. The optimum level of services has been identified in an expert view taking into consideration the costs and benefits in relation to current (September 2011) general conditions.

Yellow: Level of service between minimum and optimum service

### 2.6.2.2 TIS common LoS criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Level 0 (no service)</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A)</strong> User interface (language)</td>
<td>-</td>
<td>Language of service operator</td>
<td>Language of operator and English</td>
<td>Language of operator, English and language of neighbouring regions</td>
<td>Provision of all European languages (preferable by using language independent information catalogues; cf. TMC codes)</td>
</tr>
<tr>
<td><strong>B)</strong> Neighbouring Provision</td>
<td>-</td>
<td>local</td>
<td>regional</td>
<td>national</td>
<td>European wide</td>
</tr>
<tr>
<td><strong>C)</strong> Local and Secondary Network Information</td>
<td>None</td>
<td>TEN-T road network of service area</td>
<td>TEN-T road network and strategic non TEN-T roads of service area</td>
<td>TEN-T and secondary road network of service area</td>
<td>Whole public road network of service area</td>
</tr>
<tr>
<td><strong>D)</strong> Level of detail</td>
<td>n/a (see criteria E) and subsequent criteria</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

### 2.6.2.3 LoS for inter-modal transportation graphs

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Level 0 (no service)</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E)</strong> Pedestrian information</td>
<td>None</td>
<td>Based on car routing graph with specific attributes</td>
<td>Based on car routing graph and additional pedestrian</td>
<td>Based on car routing graph and additional pedestrian</td>
<td>Based on car routing graph and further pedestrian</td>
</tr>
<tr>
<td>Criteria</td>
<td>Level 0 (no service)</td>
<td>Level 1</td>
<td>Level 2</td>
<td>Level 3</td>
<td>Level 4</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F)</td>
<td>Bicycle information</td>
<td>None</td>
<td>Based on car routing graph with specific bicycle attributes</td>
<td>Specific bicycle routing graphs besides the road network graphs with a coverage of at least major cities/conurbations</td>
<td>Specific bicycle routing graphs besides the road network graphs with a service area wide coverage</td>
</tr>
<tr>
<td>G)</td>
<td>Car</td>
<td>None</td>
<td>Whole road network with routing graph for car traffic</td>
<td>Car routing includes real time traffic information on motorways/major road network</td>
<td>Car routing includes real time traffic information on whole road network</td>
</tr>
<tr>
<td>H)</td>
<td>Ship/Ferry</td>
<td>None</td>
<td>Static/real time timetables included for visualization</td>
<td>Inter-modal routing information based on static timetables without route visualization on map</td>
<td>Inter-modal routing information based on real time timetables without route visualization on map</td>
</tr>
<tr>
<td>I)</td>
<td>Public Transport</td>
<td>None</td>
<td>Static/real time timetables included for visualization</td>
<td>Inter-modal routing information based on static timetables without route visualization on map</td>
<td>Inter-modal routing information based on real time timetables without route visualization on map</td>
</tr>
<tr>
<td>J)</td>
<td>PT operators involved</td>
<td>None</td>
<td>Just one major PT operator (further operator exist)</td>
<td>One major PT operator plus several smaller PT operators</td>
<td>All major PT operators plus several smaller PT operators</td>
</tr>
<tr>
<td>K)</td>
<td>Plane</td>
<td>None</td>
<td>Static/real</td>
<td>Inter-modal</td>
<td>Inter-modal</td>
</tr>
<tr>
<td>Criteria</td>
<td>Level 0 (no service)</td>
<td>Level 1</td>
<td>Level 2</td>
<td>Level 3</td>
<td>Level 4</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------------</td>
<td>---------</td>
<td>----------------------------</td>
<td>----------------------------------------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>routing information based on static timetables</td>
<td>routing information based on real time timetables</td>
<td>all major means of transport compared, two connected</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>all major means of transport compared or connected</td>
</tr>
<tr>
<td>Co-modality (multi-modality, inter-modality)</td>
<td></td>
<td>two means of transport compared or connected</td>
<td>all major means of transport compared or connected</td>
<td>all major means of transport compared or connected</td>
<td>all major means of transport compared or connected</td>
</tr>
<tr>
<td>Indoor Routing</td>
<td>None</td>
<td>Major public transport terminals</td>
<td>Public transport terminals and major public buildings</td>
<td>PT terminals, public buildings, shopping arcades and centres</td>
<td></td>
</tr>
<tr>
<td>Address</td>
<td>None</td>
<td>Road sections/segments (interpolated)</td>
<td>House numbers exact</td>
<td>House numbers with exact access/entrance information</td>
<td></td>
</tr>
<tr>
<td>PT stops</td>
<td>None</td>
<td>PT stops as single point coordinates</td>
<td>PT stops with transfer connection information (time-paths between different platforms) without specific entrance information</td>
<td>PT stops with transfer connection information (time-paths between different platforms) with specific entrance information</td>
<td></td>
</tr>
<tr>
<td>Information for handicapped people</td>
<td>None</td>
<td>Public transport (handicapped accessibility)</td>
<td>Public transport with detailed information for handicapped people, including stairs, escalators, elevators and ramps.</td>
<td>PT and public buildings (handicapped accessibility)</td>
<td></td>
</tr>
<tr>
<td>POI</td>
<td>None</td>
<td>Less than 4 of the POI categories (s. below) and not all from the leading POI providers. POI categories:</td>
<td>More than 4 POI but not all categories from the leading POI providers</td>
<td>More than 4 POI and all categories from the leading POI providers</td>
<td>All POI categories from the leading POI providers</td>
</tr>
</tbody>
</table>
### Table 3: Level of service criteria for inter-modal transportation graphs

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Level 0 (no service)</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Level 1 includes:  
  - Public institutions  
  - Food and beverage sector POIs  
  - Tourism POIs  
  - Culture and entertainment POIs  
  - Accommodation POIs  
  - Sports and leisure times POIs  
  - Shopping and provisioning of services POIs

### 2.6.2.4 LoS for incident information and dynamic measurement data

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Level 0 (no service)</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closures on roads</td>
<td>None</td>
<td>Long-term planned closures on motorways and major trunk roads</td>
<td>Long-term planned closures on motorways, trunk roads and road network of conurbations</td>
<td>Besides long-term planned also short-term (daily) planned closures for network as level 2</td>
<td>Real time information about closures for whole road network</td>
</tr>
</tbody>
</table>
### Table 4: Level of service criteria for incident information and dynamic measurement data

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Level 0 (no service)</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>S) Travel time</td>
<td>None</td>
<td>Based on historical data</td>
<td>Based on historical and real time data (measurement data from stationary measurement units on road network)</td>
<td>Based on real time data from stationary and some floating measurement units plus historical data</td>
<td>Based on real time data from stationary and all major floating measurement units plus historical data</td>
</tr>
<tr>
<td>T) Messages (IT and PT)</td>
<td>None</td>
<td>Construction sites or traffic condition not for whole service area</td>
<td>Both construction sites and traffic conditions for whole service area</td>
<td>Both construction sites and traffic conditions for whole service area</td>
<td>Traffic conditions for whole service area from multiple data sources</td>
</tr>
<tr>
<td>U) Weather (road and area)</td>
<td>None</td>
<td>Area weather information</td>
<td>Area and specific road weather information derived from area weather</td>
<td>Area and specific road weather information based on stationary weather measurement units</td>
<td>Area and specific road weather information based on stationary and xFCD weather measurement units plus forecast</td>
</tr>
</tbody>
</table>

#### 2.6.2.5 LoS of usability of co-modal TIS

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Level 0 (no service)</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>V) Via points and route instant adjustment</td>
<td>None</td>
<td>Via points input through input mask</td>
<td>Via points input through input mask and map</td>
<td>Via points input through input mask and map plus instant route adjustment in map</td>
<td></td>
</tr>
<tr>
<td>W) Route visualization</td>
<td>None</td>
<td>Lists</td>
<td>Lists + static or interactive maps</td>
<td>Lists + interactive maps (with smart functions: zoom, panning, etc.)</td>
<td>Lists + interactive maps (with smart functions: zoom, panning, etc.) plus instant alternative route visualization</td>
</tr>
</tbody>
</table>
### 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.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Level 0</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessibility</td>
<td>Not relevant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Availability</td>
<td>Not guaranteed</td>
<td>Guaranteed to a minimum level</td>
<td>Guaranteed all the time</td>
<td></td>
</tr>
<tr>
<td>Timeliness</td>
<td>Not guaranteed</td>
<td>Guaranteed to a time interval</td>
<td>In real time</td>
<td></td>
</tr>
<tr>
<td>Update Frequency</td>
<td>Not defined</td>
<td>On a regular basis</td>
<td>As frequent as currently possible</td>
<td></td>
</tr>
<tr>
<td>Information Quality Assurance</td>
<td>Not defined</td>
<td>Data from one or more sources – reliability not confirmed</td>
<td>Data from one or more sources – reliability confirmed</td>
<td>Collaboration from more than one source (data fusion) – reliability confirmed</td>
</tr>
<tr>
<td>Cross verified</td>
<td>No cross verification</td>
<td>Cross verification by one additional data source</td>
<td>Cross verification by more than one additional data source</td>
<td></td>
</tr>
</tbody>
</table>
### Table 6: Level of quality for co-modal traveller information services

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Level 0</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accuracy (geographic)</strong></td>
<td>Capable to describe for human readers only</td>
<td>Capable to machine code on main roads between major junctions (e.g. TMC)</td>
<td>Capable to machine code all roads with high level dynamic location referencing (e.g. TPEG Loc)</td>
<td>Capable to code all roads with precise location referencing down to 1 meter (e.g. OpenLR)</td>
</tr>
<tr>
<td><strong>Forecast Horizon</strong></td>
<td>Only current situation</td>
<td>Current situation and short time prediction</td>
<td>Current situation and short as well as long time prediction</td>
<td></td>
</tr>
</tbody>
</table>

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

3.1 Examples of deployment

3.1.1 Germany - co-modal service “Bayerninfo”

<table>
<thead>
<tr>
<th>Service name</th>
<th>Bayerninfo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator</td>
<td>Public-Private-Partnership between the Bavarian Ministry of interior and the Bavarian Traffic Information Agency (VIB)</td>
</tr>
<tr>
<td>Contact</td>
<td>Superior Construction Authority at the Bavarian State Ministry of the Interior</td>
</tr>
<tr>
<td></td>
<td>Contactperson: Michael Müller</td>
</tr>
<tr>
<td></td>
<td>Winzererstr. 43</td>
</tr>
<tr>
<td></td>
<td>80797 Munich, Germany</td>
</tr>
</tbody>
</table>

**Operating company:**

VIB Verkehrsinformationsagentur Bayern GmbH

CEO: Dr. Gerhard Ploss, Managing Director: UweStrubbe, Thomas Lottner

Contact

UweStrubbe

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

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

<table>
<thead>
<tr>
<th>Service name</th>
<th>A nach B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator</td>
<td>ITS Vienna Region Verkehrsverbund Ost-Region (VOR) GmbH MariahilferStraße 77-79, 4.Stock A-1060 Wien Phone: +43 1 581 30 60 Mail: <a href="mailto:office@its-viennaregion.at">office@its-viennaregion.at</a> Web: <a href="http://www.its-viennaregion.at">www.its-viennaregion.at</a></td>
</tr>
<tr>
<td>Country/Region</td>
<td>Federal states Vienna, Lower Austria and Burgenland</td>
</tr>
<tr>
<td>Web-Address</td>
<td><a href="http://www.anachb.at">http://www.anachb.at</a></td>
</tr>
</tbody>
</table>
### 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.
### 3.1.3 England - co-modal service “Transport for London”

<table>
<thead>
<tr>
<th>Service name</th>
<th>Transport for London</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator</td>
<td>Transport for London</td>
</tr>
<tr>
<td>Country/Region</td>
<td>Great Britain, London</td>
</tr>
<tr>
<td>Web-Address</td>
<td><a href="http://www.tfl.gov.uk">http://www.tfl.gov.uk</a></td>
</tr>
</tbody>
</table>

**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**

Own development of user interface, the service is running since august 2002 and is extended permanently.

### 3.1.4 United Kingdom - co-modal service “Transport Direct”

<table>
<thead>
<tr>
<th>Service name</th>
<th>Transport Direct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator</td>
<td>public-private-partnership (consortium led by Atos Origin, UK Department for Transport, Welsh Assembly Government, Scottish Government)</td>
</tr>
<tr>
<td>Country/Region</td>
<td>Great Britain</td>
</tr>
<tr>
<td>Web-Address</td>
<td><a href="http://www.transportdirect.info">http://www.transportdirect.info</a></td>
</tr>
</tbody>
</table>

**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

Usage: March 2010: 60 million trips calculated
- 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.

### 3.1.5 Denmark - co-modal service "www.trafikken.dk"

<table>
<thead>
<tr>
<th>Service name</th>
<th>Multi-modal Traveller Information service, <a href="http://www.trafikken.dk/Hovedstaden">www.trafikken.dk/Hovedstaden</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator</td>
<td>Vejdirektoratet / Danish Road Directorate</td>
</tr>
<tr>
<td>Contact</td>
<td>Charlotte Holstrom, <a href="mailto:ch@vd.dk">ch@vd.dk</a></td>
</tr>
<tr>
<td>Contact for service description</td>
<td>Christian von Huth, <a href="mailto:crvh@vd.dk">crvh@vd.dk</a></td>
</tr>
<tr>
<td>Country/Region</td>
<td>Denmark - Greater Copenhagen</td>
</tr>
<tr>
<td>Web-Address</td>
<td><a href="http://www.trafikken.dk">www.trafikken.dk</a></td>
</tr>
</tbody>
</table>

The Internet based multi-modal traveller information portal www.trafikken.dk/Hovedstaden provides travellers in the Greater Copenhagen Area with a complete overview of the total transport system, including all transport means available. It provides relevant real-time information for all transport modes gathered on one portal. The service covers a problem area where motorways (TERN) are passing by a large metropolis. The partners comprise the national road administration, the municipalities, the police and all actors within public transport in the problem area (trains, busses, metro).

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
  - A core challenge is data quality and updating of data
- Institutional/organisational
  - The organisation with all actors involved requires a lot of effort to build up and maintain/continue...
**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.

<table>
<thead>
<tr>
<th>Geographical reference model</th>
<th>No information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol for data exchange and interconnecting databases</td>
<td>No information</td>
</tr>
<tr>
<td>Data model</td>
<td>No information</td>
</tr>
<tr>
<td>Data format</td>
<td>No information</td>
</tr>
<tr>
<td>User interface - common look &amp; feel</td>
<td>No information</td>
</tr>
</tbody>
</table>

### 3.1.6 Hungary - co-modal service "www.utvonalterv.hu"

<table>
<thead>
<tr>
<th>Service name</th>
<th>utvonalterv.hu - multimodal and intermodal traffic webportal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator</td>
<td>Topolisz Ltd</td>
</tr>
<tr>
<td>Contact</td>
<td>Vera Siegler- managing director</td>
</tr>
<tr>
<td>Country/Region</td>
<td>Hungary (+Romania)</td>
</tr>
<tr>
<td>Web-Address</td>
<td><a href="http://www.utvonalterv.hu">www.utvonalterv.hu</a></td>
</tr>
<tr>
<td>Short service description</td>
<td></td>
</tr>
</tbody>
</table>
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:
### Geographical reference model

No information

### Protocol for data exchange and interconnecting databases
3.1.7 Sweden - co-modal service "www.resrobot.se"

<table>
<thead>
<tr>
<th>Service name</th>
<th>Co-modal travel planner/ ResRobot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator</td>
<td>Samtrafiken</td>
</tr>
<tr>
<td></td>
<td>Contact:</td>
</tr>
<tr>
<td></td>
<td>Clas Roberg, e-mail: <a href="mailto:clas.roberg@trafikverket.se">clas.roberg@trafikverket.se</a></td>
</tr>
<tr>
<td>Country/Region</td>
<td>Sweden - TERN + all other, incl. rail networks (6097 km)</td>
</tr>
<tr>
<td>Web-Address</td>
<td><a href="http://www.resrobot.se">www.resrobot.se</a></td>
</tr>
</tbody>
</table>

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:

![ResRobot illustration](image-url)
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

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

<table>
<thead>
<tr>
<th>Service name</th>
<th>Co-modal travel planner/ Trafiken.nu - Stockholm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator</td>
<td>Swedish Transport Administration, Stockholm PT, City of Stockholm</td>
</tr>
<tr>
<td>Contact</td>
<td>Joakim Barkman, e-mail: <a href="mailto:joakim.barkman@trafikverket.se">joakim.barkman@trafikverket.se</a></td>
</tr>
<tr>
<td>Country/Region</td>
<td>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</td>
</tr>
</tbody>
</table>
### 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 prestudy based on previous work on traveltime 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](image)

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
3.1.9 Austria - co-modal service "Verkehrspilot"

<table>
<thead>
<tr>
<th>Service name</th>
<th>Verkehrspilot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator</td>
<td>ASFINAG, ÖBB, Austro Control</td>
</tr>
<tr>
<td>Contact</td>
<td>Martin Müllner</td>
</tr>
<tr>
<td>Country/Region</td>
<td>Austria - High Level Roadnetwork; 2175 km</td>
</tr>
<tr>
<td>Web-Address</td>
<td><a href="http://www.verkehrspilot.at">http://www.verkehrspilot.at</a></td>
</tr>
</tbody>
</table>

**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).

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 enduser 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
3.2 Business Model

3.2.1 Stakeholders in Service Provision

Please see chapter 2.3

3.2.2 Cost / Benefit Analysis

Co-modal services are very complex and provide comprehensive traveller and road user information. Yet no substantial cost / benefit analyses exist.
# Annex A: Compliance Checklist

## 4.1 Compliance checklist "must"

<table>
<thead>
<tr>
<th>#</th>
<th>Requirement</th>
<th>Fulfilled?</th>
<th>If no – quote of insurmountable reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Functional requirements</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR1</td>
<td>Co-modal TIS <strong>must</strong> 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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR2</td>
<td>Co-modal TIS <strong>must</strong> use most common data formats for data exchange and interconnecting different databases of different data sources. Most common data formats means that service developer must orient on already existing best practices (s. chapters 2.4.2 and 3.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR3</td>
<td>Co-modal TIS content and service platform <strong>must</strong> be based on a harmonised data model for each service feature. Service developer must orient the data model on already existing best practices (s. chapters 2.4.2 and 3.1) as yet no common standard exists.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR4</td>
<td>Co-modal TIS <strong>must</strong> follow the common look &amp; feel principles (requirements) as described in chapter 2.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR5</td>
<td>Co-modal services <strong>must</strong> at least reach the minimum level of service (marked in orange or grey colour) of the criteria in Table 2, Table 3, Table 4 and Table 5 as far as the service offers the service criteria. The minimum level of services has been identified in an expert view and is not based on scientific analysis.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Organisational requirements:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR2</td>
<td>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 <strong>must</strong> reflect an</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR6</td>
<td>Co-modal service providers <strong>must</strong> take into consideration the ITS action plan as where co-modality is among the priority issues identified by the EC.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR7</td>
<td>Co-modal service providers <strong>must</strong> take into consideration the ITS directive (2010/40/EU) when developing services</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Technical requirements

| TR1 | Co-modal services **must** integrate road transport data, public transport data and must be based on transport mode comprehensive system requirements (s. point 1-3 in chapter 2.4.1) |

### Required Common Look & Feel

| CL&FR1 | Co-modal services **must** take into consideration the requirements for colour blind and other visually impaired people as far as possible |
| CL&FR3 | Co-modal services **must** use different colours to indicate the different means of transport in maps. |
| CL&FR4 | Co-modal services **must** use a common look & feel and colour scheme on the maps shown in the internet as well as for printed maps |
| CL&FR7 | Co-modal services **must** understand their service features as defined in chapter 2.5.4 |
| CL&FR8 | Co-modal services input masks **must** be oriented on already existing deployments (see chapter 3.1) |
| CL&FR9 | The presentation of co-modal traveller information besides the map presentation **must** be oriented on already existing deployments (see chapter 3.1). |

### Level of Service requirements

| LoSR1 | Co-modal services **must** at least reach the minimum level of service (marked in orange or grey colour) of the criteria in Table 2, Table 3, Table 4 and Table 5 as far as the service offers the service criteria. The minimum level of services has been identified in an expert view and is not based on scientific analysis. |
## 4.2 Compliance checklist "should"

<table>
<thead>
<tr>
<th>#</th>
<th>Requirement</th>
<th>Fulfilled?</th>
<th>If no – explanation of deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

### Functional requirements

**FR6** Co-modal services **should** reach the optimum level of service (marked in green or grey colour) of the criteria in Table 2, Table 3, Table 4 and Table 5 as far as the service offers the service criteria. The optimum level of services has been identified in an expert view taking into consideration the costs and benefits in relation to current (September 2011) general conditions.

### Organisational requirements:

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

**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.

**OR4** Under Chapter 0 the optimum and minimum LoS for co-modal TIS are defined. For the minimum LoS, reflecting also the basic service requirements, the **recommended** organisational characteristics (following the schema and abbreviations of Figure 3) are the following:

- 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 **should** 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 is a good blue print.

### Technical requirements
### TR2
Co-modal services **should** use and choose the best fitting standards and if no suitable standards exist the services should follow initiatives. The standards and initiatives are listed under chapter 2.4.2.

### Required Common Look & Feel

#### CL&FR2
Co-modal services **should** use the colours for means of transport route indication as provided in chapter 2.5.1 as far as these colours have enough contrast to the map background information.

#### CL&FR5
Co-modal services **should** use the icon-sets as provided in chapter 2.5.2 (besides the yellow marked icons). Further icons are possible but these have to be communicated in advance to the DG coordinators and **should** follow the same icon design and colour scheme.

#### CL&FR6
Co-modal services **should** use the icon-set as provided in chapter 2.5.3. Further icons are possible but these have to be communicated in advance to the DG coordinators and **should** follow the same icon design and colour scheme.

### Level of Service requirements

#### LoSR2
Co-modal services **should** reach the optimum level of service (marked in green or grey colour) of the criteria in Table 2, Table 3, Table 4 and Table 5 as far as the service offers the service criteria. The optimum level of services has been identified in an expert view taking into consideration the costs and benefits in relation to current (September 2011) general conditions.

#### 4.1 Compliance checklist "may"

<table>
<thead>
<tr>
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<th>Requirement</th>
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</thead>
<tbody>
<tr>
<td></td>
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</tr>
<tr>
<td>Functional requirements</td>
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<td>Organisational requirements</td>
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<tr>
<td>Technical requirements</td>
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<td></td>
</tr>
<tr>
<td>Required Common Look &amp; Feel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
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<td></td>
</tr>
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<td>None</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Level of Service Requirements</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>
5 Annex B: Bibliography

- Data model for co-modal traveller information services INTREST (www.intrest.org)
- Directive 2010/40/EU of the European Parliament and of the Council (ITS directive)