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WISETRIP: Wide Scale network of E-systems for Multimodal Journey Planning and Delivery of Trip Intelligent Personalised data

D2.1: Report on the Analysis of Requirements

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Abstract

WISETRIP project is a Collaborative project co-financed by EU FP7 programme under Theme TPT.2007.4 “The connected traveller in the city, region and world of tomorrow”. The goal of WISETRIP is to develop and validate an innovative mobility service platform, which provides personalized multi-modal travel information sourced from connected variant journey planners. The proposed system is accessible by travelers through various mobile or fixed terminals/devices before and during the journey. The project will take the reference of the existing independent systems for journey planning that will become active subsystems of a ‘global’ journey planner system.

Task 2.1 (“Development of the methodological framework and analysis of the user requirements”) aims at the development and implementation of a methodological framework for the determination and assessment of the potential system functionalities on the basis of covering the user needs and the relevant system constraints. This document provides the proposed methodological framework and the results that emerged from its implementation for identifying WISETRIP user requirements. The major milestones in order to achieve the objectives of Task 2.1 include:

i) a review of the major features of various existing journey planners based on an international survey for internet-based journey planners and the relevant work performed within EC Research projects (Task 2.2),

ii) the collection and analysis of importance or/satisfaction ratings provided by end-users and experts for the user needs.

The results of the above analysis indicated that international and interurban journey planning and real time personalised alerting (on the mobile phone) for any disruption of a journey constitute the most significant system functionalities for WISETRIP. The outcome of Task 2.1 will be used in Task 2.3 “Architecture Design and Data Framework” as the basis for selecting the functionalities that should be included in WISETRIP and specifying the design of the system.
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1. Introduction

1.1. Document Objectives

The goal behind the design of WISETRIP relates to the identification of the passenger information and journey planning features that best fit to the user needs. Thus, before commencing the design of WISETRIP it is essential to specify the major services that should be provided by the WISETRIP system based on the user needs, taking into account the prevailing technological, legal and institutional constraints which are pertinent to the proposed system. Task 2.1 “Development of the Methodological Framework and Analysis of the user Requirements” of WISETRIP project aims to address this goal through the activities outlined in Figure 1.

The identification of user requirements for the WISETRIP system constitutes the major goal of the above process. The achievement of this goal is based on developing and implementing a methodological framework which aims at identifying and assessing the potential journey planning and information services in terms of complying with the user needs and the prevailing legal, institutional, and technological framework. According to the proposed methodological framework, the user requirements for WISETRIP emerged in two stages.

- At the first stage a set of preliminary user needs has been identified taking into account the characteristics of the existing systems. A critical review of the existing systems has provided the basis for determining their strengths and weaknesses and the potential enhancements which could be addressed by WISETRIP. The emerging set of preliminary
users needs refers to the major journey planning and information provision features that should be addressed by the proposed system. This set of features have been identified and assessed by the users through relevant surveys performed at each country represented in the project.

- The second stage of the process involved the refinement of the preliminary user needs (by assessing them in terms of importance) and the identification and assessment of the potential system functionalities in terms of covering the (refined) user needs. The prioritized potential system functionalities constitute the major user requirements for WISETRIP.

The objectives of this document are to:

i) Present the methodological framework for specifying the user requirements,

ii) Provide the major constraints dominating the system design and development,

iii) Present the major user needs identified for WISETRIP,

iv) Expose the analysis performed and the associate results for the user requirements identification.

The user requirements proposed in this document will be used as the basis for designing WISETRIP, i.e. determine how the generic functionalities presented in this document will be implemented in WISETRIP.

1.2. Structure of the Document

The remainder of this report consists of seven sections and three appendices.

- Section two presents the methodological framework for identifying the user requirements for the WISETRIP system.
- Section three presents the findings from the journey planners survey and the emerging preliminary user needs.
- Section four presents the major Technological, Institutional, and Business constraints pertinent to the development of WISETRIP.
- Section five provides an overview of the potential system functionalities which cover the user needs and align with the relevant constraints.
- Section six provides an overview of the data collection process for obtaining the user needs and expectations from WSIETRIP.
- Section seven describes the results from the user requirements analysis.
- Section eight provides the conclusions that emerge from the User Requirements identification process and presents the future steps in the WISETRIP projects.
- Appendices I and II include the questionnaires used for the user needs data collection, and Appendix III includes the detailed Journey Planners Overview Report (D2.1a).
2. Methodology for User Requirements Elicitation

A critical step in designing the WISETRIP journey planner relates to the elicitation of the users requirements. The analysis of the user needs and the associated technological, institutional, and business oriented constraints constitute the basis for identifying the WISETRIP user requirements. The objective of this section is to present the methodological steps for achieving this goal.

2.1. Overview of the User Requirements Elicitation Methodology

The scope of the proposed methodology for the determination of the user requirements relates to the specification of the potential passenger information and journey planning functionalities that comply with the user needs. The methodology for achieving this goal should consider the following issues:

- The user requirements should reflect the needs of all categories of users, e.g. international or interurban travellers, urban travellers, and transport operators or managers providing transport related data.
- The user requirements elicitation should also take into account the various constraints and potential implementation limitations of the system.
- The potential system functionalities should address at least one of the user needs not fully (or substantially) covered by relevant services offered by existing systems. Taking into account that different weights of importance are assigned to the user needs, it is essential for the user requirements elicitation to determine the potential system functionalities covering the most important user needs (i.e., those with the highest importance weight from the perspective of the users).

The concept behind the user requirements identification involves the determination of those potential WISETRIP functionalities that cover the user needs with: i) the highest importance from the users’ perspective, and ii) limited coverage from the existing journey planners. Figure 2 illustrates this idea schematically.

![Diagram](image)

Figure 2. Basic concept for identifying user requirements.
This target may be achieved through the methodological steps presented in Figure 3. A major prerequisite for identifying the user requirements refers to the identification of the users groups, i.e., the potential categories of end users (i.e. categories of travellers having interest in WISETRIP) and intermediate users referring to the transport related data providers (e.g. transport operators, journey planner managers, etc.).

A set of preliminary user needs is determined by analysing the features of the major existing journey planners and identifying the gaps or shortcomings in the services offered. This goal is achieved by performing an international survey for journey planners along with a literature review for relevant system developed in EC research projects.

The preliminary user needs identified through this process involve a set of generic journey planning and information services reflecting the users’ expectations. A set of system functionalities are identified on the basis of covering the preliminary user needs and the relevant technological, institutional, and business constraints usually pertinent to this type of systems are also specified.

The preliminary user needs are further assessed in terms of the weight of importance assigned to them by the end-users, resulting to a refined set of user needs.

The list of potential system functionalities are then prioritised on the basis of their contribution in covering the refined user needs. The Quality Function Deployment (QFD) method has been applied for analyzing the user needs and prioritizing the potential system functionalities.

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Figure 3. Overview of the proposed methodological framework for the identification of the user requirements.

QFD is a method widely used in many industries including information system development. Details regarding the major steps of QFD can be found in (Cohen, 1997). The application of the
QFD method in the context of WISETRIP, aims at identifying overall weights for the system functionalities candidate for the proposed system. The expected outcome is to rank the candidate functionalities in terms of the overall weights. More details regarding the application of the QFD method for the WISETRIP user needs analysis is provided in sub-section 2.2.

### 2.2. User Needs Analysis

Implementing the QFD method for identification of the WISETRIP user requirements implies the analysis of the user needs through the House of Quality (HOQ) scheme presented in Figure 4. The HOQ scheme constitutes a structure for collecting and processing the data (weights) required for prioritizing the potential system functionalities. In particular, the data needed reflect the:

- Weights of importance for the user needs
- the degree of users satisfaction regarding the way that the user needs are addressed by existing systems
- The degree of linkage between each potential system functionality and the relevant user needs
- Weights of the potential functionalities in terms of covering each of the user needs

In particular, the HOQ consists of five parts. PART-A is the first column of the HOQ table, which is filled with the potential journey planning and information needs for WISETRIP. PART-B is the first row of the table, which hosts the potential system functionalities of WISETRIP. The remaining parts of the table are completed with the following types of weights:

1. Each element (i,j) of PART-C is assigned a score from 1-5 (where 1 stands for unimportant and 5 for very important) expressing the degree of linkage of functionality j (in Part-B row) with user need i (in Part-A column). The higher the weight of importance of functionality j in terms of covering user need i is, the more sensitive the satisfaction of the user with respect to need i is, i.e., any minor improvement in the provision of functionality j causes significant increase in satisfaction of the user from covering need i. The elements of PART-C are completed by experts having substantial knowledge on advanced passenger information and journey planning systems.

2. PART-D includes six columns, each one referring to the weights indicated in Figure 4. In particular, the weights in column 1 refer to the importance assigned by the users to each of the corresponding needs provided in Part-A.
   - Column 2 includes the weights expressing the degree of satisfaction of the users from the existing systems in terms of covering the corresponding user needs (in Part A).
   - Column 3 includes the weights assigned by the experts (WISETRIP developers) to each user need expressing their interest in addressing the corresponding user need.
   - Column 4 cells host the ratio of the corresponding weight in column 3 with the one in column 2. In essence, the higher this ratio, the more promising results are expected from covering the corresponding user need.
   - Column 5 includes the weights emerging from multiplying the weights of columns 1 and 4. The emerging weights express the overall weight assigned to the corresponding user needs. It is evident that this metric takes into account the interest of the developers, the importance assigned by the users and the degree of coverage from the existing services.
   - Column 6 includes the normalized weights hosted in column 5, i.e. ratio of each weight in column 5 with the sum of weights in column 5.

3. **Part-E consists of the row at the bottom of the HOQ scheme. Each element (j) of the row includes the overall weight calculated for the corresponding functionality (j) in Part-B. This priority emerges from the weighted sum of the elements of column (j) of Part-C, where each such element is multiplied by the corresponding overall weight in column 6 of Part-D. Based on the overall weights in Part-E, the potential WISETRIP functionalities are grouped into three categories:**
i) Essential functionalities with the overall priority exceeding 3.5,
ii) Functionalities of moderate importance if the overall weight lies between 1.5 and 3.5, and
iii) Functionalities with low importance (if between 0 and 1.5)

More information about the calculations performed within the HOQ is provided in (Bossert, 1991; Cohen, 1995).

Figure 4. House of Quality diagram of the WISETRIP user needs analysis

A critical aspect of the QFD application for the WISETRIP User Requirements, relates to the input required by the end users and experts in journey planning (system developers). In particular, the experts (developers of WISETRIP) should complete PART-C, and column 3 of Part D. On the other hand, a sample of end-users should be surveyed in order to provide the scores for completing columns 1, 2 of Part D. The median of the scores collected by the sample of users will be placed in the corresponding cells of the HOQ scheme. Thus, the users sample size should guarantee the accurate estimation of the mean score value for each weight of HOQ. The survey conducted for the collection of the required input in terms of scores (1-5) should be accommodated by appropriate data collection tools (i.e. questionnaires). The relevant questionnaire for WISETRIP is provided in Appendix I of this report.
3. User Needs

The potential functionalities for WISETRIP were identified on the basis of covering the journey planning and information needs of the users. This section aims to present the major categories of users of WISETRIP and their needs.

3.1. User Groups

Two major categories of WISETRIP users are identified: i) the intermediate users referring to the information providers and actors that offer the WISETRIP services (e.g., an airport authority hosting a WISETRIP info kiosk), and ii) the end users including referring to the travellers.

The intermediate users of WISETRIP involve the public transport related data providers, including Intermodal Public Transport Terminals (airports, ports, and railway stations), Urban and Interurban Public Transport Service Providers. The dissemination of information is the major objective of intermediate users. Nowadays, internet-based passenger information and journey planning systems constitute significant means for disseminating travel information. Several private and public transport operators or managers have developed and deployed journey planners providing various types of travel information regarding the transport services they offer at local or regional geographical level. In this context, the intermediate users constitute the major sources of travel information (e.g., timetable schedule and routes for transport services, commercial activities at terminals, services offered at terminals, etc.) required by WISETRIP.

On the other hand, the end-users consist of various categories of travellers including:

- Long Distance Travellers, including Inbound Travellers (making national-level interurban journeys) and Outbound Travellers (making cross country trips)
- Urban Travellers, referring to the users of the urban public transport system. In the context of developing WISETRIP, special focus is placed on the needs of the unfamiliar users (rather than the regular commuters) of an urban public transport system. In particular, the unfamiliar users needs constitutes the basis for specifying the type and level of detail of the travel information provided by the system for any intermediate urban transport leg within an interurban journey plan proposed by the system.

The needs of users basically relate to the gaps and limitations of the services provided by the existing journey planners. Thus, the identification of the user needs was achieved by conducting an international survey of the journey planners over several transport operators and information providers regarding the functionalities of the existing systems, the institutional barriers and enablers, and their enhancements planned for the forthcoming period. The major features of each journey planner included in the survey were specified, leading to the gaps and the potential enhancements in the services offered. The next section provides an overview of the major features of the journey planners included in the relevant survey.

It should be emphasized at this point that the development of WISETRIP will be based on the integration of existing urban and/or interurban journey planners. In this respect, a significant set of needs for urban and interurban journeys are indirectly covered by the system through the services offered by the participating journey planners. Thus, the identification of the user requirements of WISETRIP is based on the user needs for international journeys.

3.2. Features of Existing Passenger Information and Journey Planning Systems

The objective of this section is to present an overview of the features of the existing journey planners and the potential enhancements of these systems in the forthcoming period. The goal
of this analysis is to specify the state-of-the-art and practice of journey planners and identify the gaps encountered the services offered.

In more detail, this section reports the outcome of three activities that have been conducted as part of the review of previous relevant experience, namely:

i) review of previous EU projects of direct interest to WISETRIP;

ii) an international survey of experience with internet-based journey planners (launched in March 2008);

iii) case studies of selected journey planners (including documentation of previous evaluation studies, e.g. Zografos, et al., 2008).

Further details of each of these activities may be found in Deliverable 2.1a which forms Appendix III to this report.

An international survey covering 25 Journey Planners proved to be a fruitful exercise and so the majority of this section summarizes the relevant outcome. Each of the participating WISETRIP Journey Planners is also included in the survey as this provides an opportunity to benchmark against current state-of-practice. Particularly interesting results were found for Journey Planners in Denmark, Germany and the Netherlands (which are not represented within the WISETRIP consortium). These have also been investigated further in order to specify the major categories of institutional constraints and considerations prevailing for journey planners.

### 3.2.1. Previous relevant work

Previous research has highlighted the importance of accurate, good quality information for journey planning (Kenyon and Lyons, 2003). The availability of comprehensive information can engender knowledge and confidence, foster positive attitudes towards the service provider and create favourable perceptions of efficiency and security. Indeed, information has become such a vital commodity that one can argue that informed travellers are the key to successful future transport service provision. One of the responses to the need for informed travel planning and execution has been the development of internet-based journey planners, several of which are described in this chapter. A useful overview of recent information systems (in its widest sense) is found in eMOTION (2006).

A series of previous EC research projects have been focused on the development of advanced information systems for providing users (travellers mainly focused on accessing transport services and/or tourists with an interest in multi-service / activity information) with dynamic travel information and multimodal trip planning services; e.g. IMAGE, CRUMPET, Wh@M, ADAMANT, eMOTION, and IM@GINE-IT. Some of their relevant characteristics are summarized in Table 1.

A useful classification is offered by IMAGINE-IT (2004) who observed that (in 2004) relevant projects could be divided into three main categories:

- Projects focusing on mobile and / or Location Based Services (LBS) addressing tourist users
- Projects focusing on drivers’ users and in-vehicle services
- Projects focusing on generic navigation / routing and public transport information.

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<th>Sector</th>
<th>Media</th>
<th>Relevance to WISETRIP</th>
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<td>IMAGE - Intelligent Mobility Agent for Complex Geographic Environments (2001-2003), IST-2000-30047.</td>
<td>Tourism</td>
<td>Multi-source; Public Transport; urban</td>
<td>Mobile; LBS M</td>
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Table 1. Characteristics of previous relevant EC projects.

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<th>Target Users</th>
<th>Sector</th>
<th>Media</th>
<th>Relevance to WISETRIP</th>
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<tr>
<td>ADAMANT -Airport Decision And Management Network (2002-2005) IST-2001-39117</td>
<td>Tourism</td>
<td>Inter-urban air travel; within airport</td>
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<td>IM@GINE IT- Intelligent Mobility Agents Advanced Positioning and Mapping Technologies, Integrated Interoperable Multimodal Location Based Services (2004-2006) IST-508008</td>
<td>Tourism</td>
<td>Private and Public Transport</td>
<td>PDA, in-vehicle; real-time; LBS</td>
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<tr>
<td>eMOTION – Europe-wide multi-Modal On-trip Traffic Information (2006-2008) TREN/06/FP6TR/ S07.57248/ 019939 EMOTION</td>
<td>Tourism</td>
<td>Intermodal, urban, inter-urban</td>
<td>Web, mobile services; LBS</td>
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Given their clear relevance to WISETRIP the eMOTION and IM@GINE-IT projects are subject to detailed scrutiny and this is reported in D2.1a. In brief, eMOTION has developed a system architecture for the integration of existing information services to develop a European approach to multi-modal on-trip traffic information services in real-time. The following information services have been analyzed and estimated for its up-to-dateness, type of content owner, types of communication channels and data formats, standards for data models and data access / communication and costs and contractual issues (eMOTION, 2006):

- Road network data
- Public transport network data
- Traffic flow
- Traffic messages
- Public transport timetable
- Dynamic parking information
- Data about points of interest
- Weather data
- Map data

The technical specification of the eMOTION system which is useful for the categorization of data sources is reported in eMOTION (2008).

As Table 1 shows IM@GINE-IT has developed a system which provides a single access point through which the user can obtain location-based, multi-modal transport information (static and dynamic), mapping and routing, navigation and other related services. These services should be available everywhere, anytime, taking into account the personal preferences of the user (IMAGINE-IT, 2004). Of particular value to WISETRIP is the use case analysis which covers the following activities: administrative, trip planning, active trip and push events (further details may be found in D2.1a).

Deliverable 2.1a (Appendix III) also introduces two further recent relevant EU projects: EU Spirit and ITISS. Among the European projects which look at cross-border journey planning systems, the EU Spirit and ITISS projects show similarity to WISETRIP except on the geographical coverage and the media service offered.
It is clear however from this brief review of experience that there is an opportunity to provide a service for planning and executing multi-modal journeys beyond regional and national boundaries and this is the area that WISETRIP seeks to address. This observation is confirmed by the results of the international survey of experience which are summarized in the remainder of this section.

3.2.2. Findings from the international survey of experience with internet-based journey planners

The information in this section has been collated following an international survey of Internet based Journey Planner systems conducted by the WISETRIP consortium in March 2008. The survey resulted in information being provided for a total of 25 Journey Planners from 8 European countries plus China and Japan.

Overall, 11 main features of existing Journey Planners (JPs) have been identified and information on each feature was captured through the survey questionnaire. A summary table collating all 25 survey responses is provided in Appendix III.

The main variations in the features of each system are highlighted below and the key priorities for further development identified by those responding to the survey are summarized at the end of this section.

Mode type covered

Half the responses received related to single mode journey planners. Journey Planners (JPs) which deal only with one motorized mode are considered as single mode even if they include walking times at the start and end of journeys or at interchange points. Most single mode JPs provided information on bus services although there were examples of rail and private car single mode JPs provided. There appears to be 2 groups of multimode JPs; those offering public transport solutions by a variety of possible modes and those which offer private car journey information in addition to public transport options to enable car owners to make informed decisions about whether to drive or not. Car parking information is also provided by some JPs, e.g. Transport Direct (UK).

Although DRT is seen as a 'bus' by end users, JP's need to deal with fixed route bus and DRT very differently. As yet it appears that the vast majority of JPs have not yet come to terms with how best to represent DRT services and only one (the German The Intermodal Journey Planner by Mentz DV Munich) out of 25 survey responses claimed to include a representation of DRT in the results returned to users. For this JP Demand Responsive Transport (DRT) is included by trip-related notes. In the future a central notification procedure for these trips will be implemented. The system should then be able to transmit the notification to the responsible transport operator.

Info provided to user

Route information is provided by all JPs responding to the survey and schedule information for all but one. Availability of information on fares appears to depend on the mode as well as national regulation. For instance fare information is common for rail based JPs and also long distance bus travel but local bus fare information is less commonly available. The estimated cost of a car journey can be obtained from several JPs offering private car journey information. Walking times are generally provided for the start and end of the journey and for any interchange required except for some single mode JPs and for private car only JPs. It is noticeable that the JPs described for China lack this piece of information despite including public transport modes.
Some JPs also offer information on CO₂ emissions for a car or public transport for a specified journey. Although some local JPs only provide information in the local language, most national JPs provide information in at least the local language as well as English and in some cases in the languages of neighbouring countries.

Geographic Coverage
Almost three out of four of the JPs reviewed provided information at the local or regional level and less than half provided information on a national basis. Less than a one out of four claimed to be international, although most of these related to JPs in relatively small countries which have integrated transport networks with neighbouring countries. A notable exception to this is The Trainline JP in the UK which provides rail information across Europe.

Information display
Map based information supported by tabulated results are the most common means of presenting the results to the end users. In a number of cases this is accompanied by route diagrams. Only one JP (Google Transit Firenze in Italy) currently utilises Google Maps to display the information.

Criteria to calculate itineraries
Almost all JPs reviewed calculated itineraries based on minimizing en-route time as well providing the option of minimizing number of transfers. The Finnish, German Danish and Japanese JPs also allowed minimizing walk time. A couple of UK JPs which allowed rail based ticket booking also provided itinerary optimization based on minimizing cost. Three particularly interesting JPs regarding criteria used to calculate itineraries are:

- ENOSIS Urban Journey Planner from Greece in which lexicographic ordering is used in order to determine optimal itinerary;
- Intermodal Journey Planner from Germany generates automatically the fastest connections based on personalized user specified criteria including transfers, walking speed, exclusion of means of transport, barrier-free routing;
- Transport Direct from the UK can calculate car routes based on minimum en-route time accounting for predicted traffic levels at different times of the day so the user can make informed decisions about when to travel.

Other content features
Many respondents stated that real-time information was provided but this often related to travel news updates on traffic conditions and delays for presentation on the JP web-site but did not provide real time data used in the JP route optimization or to ‘alert’ users of real time delays to previous journey details. Notable exceptions to this are:

- ENOSIS Urban Journey Planner from Greece provides real-time information available via SMS or E-MAIL (according to the user’s profile) about delays or cancellations for air routes to Athens International Airport and ferries at Heracleion port;
- Greek City Journey Planners provide real-time forecast for urban bus arrivals and departures;
- the Dutch 9292ov JP provides real-time congestion and delays for public transport;

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Yahoo, Route Selection in Japan uses on-line real-time information according to the actual operational status of all modes of transportation covered by the JP (bus, rail and air).

Although it appears that only the Greek and Dutch JPs have an ‘alert’ facility for updating information by SMS while the traveller is en-route, there are plans to introduce this feature in several other JPs.

Just over a third of the JPs reviewed stated they provided other services. These often took the form of travel agency information, point of interest tourist information and links to other tourist services. Weather forecast information is available via a few JPs.

The Traveline JP also provides the txt2traveline service allowing texting an 8-digit bus stop reference code to return the departure times of the next few buses from your chosen stop. The message can be customized to allow choice of destination, specific bus service, time period or date. The service is automated and operates 24 hours-a-day, every day.

Page landing wizard is another interesting development in the use of journey planners. This enables 3rd party websites to embed the JP planner onto their sites. This is provided by the Traveline JP (UK) and Rejseplanen JP (Denmark).

Other interesting features include a carbon calculator to enable users to see how much travelling by train can help to reduce their carbon footprint in the The Trainline JP (UK).

Dynamic travel information is only provided in 4 out of the 25 JPs surveyed. In the German Intermodal Journey Planner dynamic information is provided based on their Content Management System. Latest information on blocked routes and route diversions can be given route-, trip-, and direction-related. Alternative routes are provided in addition to notes showing restrictions of normal service.

Ticket booking is only available at 20% of the JPs reviewed and related to only rail travel or long distance bus travel in the case of the Megabus JP (UK) where only one operator is involved. Where ticket booking is available the JP must also provide itinerary storage and update facility.

The The Trainline JP (UK) provides the Mobitix system allowing customers to receive their tickets directly to their mobile phone. The tickets contain a number of visual security checks and can be inspected using handheld ticket checkers. The Print@home system allows tickets to some train operators to simply buy their ticket via TheTrainline and print it on ordinary plain A4 paper.

Other media for accessing info

The journey planners reviewed from UK, Finland, Germany, Denmark, Greece and the Netherlands generally enable communication and information exchange via SMS, while those from Italy, Spain, China and Japan do not. Kiosks or terminals are rarely used now in the countries with more established mobile communication infrastructure however these are still found in China where the mobile penetration rates and internet connections are still relatively low, but growing rapidly. Telephone call centres still form an important part of the JP package in more than half the responses received. This human interface is still viewed as essential for large sections of the population who are not PC literate or have access to internet and mobile technologies.

Limitations of existing JPs

The main limitations for many of the JPs reviewed related to difficulties experienced in the supply of data. Problems mentioned included: differing data formats provided by different suppliers of data; gaps in service data provided to the data manager; unwillingness of some transport operators to provide data; difficulties of updating and maintaining large quantities of data from many different sources; frequency with which changes in service data occur. A lack of real time up-to-date of information was also mentioned as a problem.
Key Priorities for the next 5 years

In Italy the key priorities for further development included improvements of cartography to display the information with higher clarity and quality and optimizing the transfer of data between the transport operators and local Agencies to the JP manager. The aim is to reduce the time spent on this and to increase the quality of data supplied. A single format to collect and provide data to the JP manager needs to be introduced.

In the UK key priorities mentioned included development of smartcard technology for the train industry and other technologies making ticket purchase simpler and less labour intensive. Further improvements to rail journey planning and mixing a car journey with Public Transport so you can plan a 'Drive and Ride' journey more easily was also desired.

In Finland further development in the integration of dynamic data and inclusion of all modes as well as demand responsive transport was identified as a priority. Improvement of scope and quality of the data is the main development aspect for Journey.fi service. Other key priorities are use of real-time data (e.g. delay information) and storage and exploitation of history data in personal taxation (e.g. need to use private car for commuting). Further development possibilities of ferry, private car and fare data are being investigated. A target is that the Journey.fi journey planner will be used in city planning as well as in defining necessary density of public transport.

Key priorities for the German Intermodal Journey Planner include use of real-time information, dynamic creation of network route maps, stop indexes, location maps, and GPS-routing for mobile devices. It was pointed out that Journey planners are subject to continuous changes responding to advanced in technology and to requirements of the user.

In Denmark the main priority is real-time implementation since this is central for the development of more personalized services which will be the core focus in the future for the Rejseplanen JP. The possibility to provide personalized information before, during and after the journey will give the costumer an added value which will bring more people into public transportation. It is planned to connect to the users where they are and in the situation where they need to use it, so basically to be mobile; on mobile phone or car navigation etc. Demand Responsive Transport is under development and will hopefully be available in 2008.

Key priorities in Greece include full scale multi-modality, real-time travel time updates and the development of dynamic routing. Also important is developing instructions to guide travellers during mode interchanges (preferred exit/entrance and how to find it) and instructions on which platform or station to stand in order to get on the vehicle going on the right direction. Delivering reservation and tickets as easy as possible, on A4 paper or through the mobile devices is also being considered.

The Netherlands JPs are interested in providing up-to-date, real time and reliable information to travellers en-route.

In China the key priorities identified were to display map based information to the users and to add fare information to the system, while in Japan the priority for the Yahoo, Route Selection JP is to develop a rail JP

3.2.3. Summary of Results from the Journey Planners Survey

The analysis of the findings from the Journey Planners survey, have led to the identification of the following limitations and shortcomings of the existing systems:

- No international door to door multimodal journey planning services has been identified among the journey planners surveyed. To be more specific, the existing international journey planners involve either a single mode, or they only cover trips to neighbouring countries.
• Availability of fare information is very limited since it is only provided for specific transport services.
• The information offered by the journey planners is basically provided in the local national language. Limited use of English was encountered.
• Clearly there is a lack in offering real time alerts to travellers. Nevertheless, this is a feature that many journey planners envisage for the near future.
• Limited ticket booking was encountered (i.e., only for single mode).
• Limited use of Dynamic and real time data in journey planning and information services.

The above findings provide the basis for identifying potential enhancements integrated in WISETRIP in order to overcome that above limitations. In this context, the following generic services could be covered by WISETRIP:

i) door to door international journey planning service,
ii) real-time alerts while en-route (creation and management of personal profile constitutes a prerequisite for this functionality),
iii) on line ticket booking capabilities, and iv) journey planning based on dynamic schedule and traffic data.

3.3. Preliminary WISETRIP User Needs

WISETRIP aims to support journey planning decisions for the following types of journeys:

i) intra-urban,
ii) interurban,
iii) international.

The proposed system will be based on the integration of the primary travel information provided by existing journey planners covering any of the above three types of journeys. Thus, the major objective of WISETRIP is to retrieve and process the information provided by the participating journey planners in order to provide integrated interurban and international itineraries covering every part of the journey, including the transfers between transport modes. Since the participating journey planners will account for the urban and interurban journey planning, the major thrust of WISETRIP will be focused on international journey planning. The major innovation of the system relates to the determination of alternative multimodal itineraries (including urban, interurban, and international transport services) that could potentially realize a journey from anywhere in one country to anywhere in another country. In this context, the user requirements analysis will be based on the journey planning and information needs for international journeys.

The information needs that will be taken into account for the user requirements identification refer to every phase of the trip, including pre-trip, en-route, and post trip information. In other words this category of user needs relates to the question: “What type of information does the traveller need during his/her journey?”

Table 2 below presents the preliminary (superset of) needs of users for information and journey planning services. The identification of the preliminary user needs has been based on the findings from the survey of existing journey planners and other existing studies (Molin, Timmermans, 2006; Rehrl et al., 2007; Zografos, 2002, Zografos et al, 2008) and relevant research activities (EMOTION consortium, 2007; IMAGINE IT consortium, 2006). Note that this set of user needs will be assessed by the end users in terms of importance, and eventually, those with very low importance (if any) will be discarded from further consideration.

<table>
<thead>
<tr>
<th>Trip Stage</th>
<th>Information Needs</th>
<th>ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-trip</td>
<td>Creating and retrieving a personal profile anytime &amp; anywhere</td>
<td>N1</td>
</tr>
<tr>
<td></td>
<td>Detailed description of the part of the itinerary covering foreign countries with specialized information on how to transfer between modes</td>
<td>N2</td>
</tr>
</tbody>
</table>
Access to on-line journey booking \[ N3 \]
Alerts (by SMS or e-mail) regarding any disruption of the selected itinerary before the commencement of the journey \[ N4 \]
En-route
Replan the remaining itinerary from current intermediate stop to destination \[ N5 \]
Real time alerts about disruption of transport services affecting the trip \[ N6 \]
Real time alerts about delays affecting the trip \[ N7 \]
Reminder of the next transport service, departure time and boarding location (e.g. platform) \[ N8 \]
Post Trip
Points for Tourist info \[ N9 \]
Points for Car-hire \[ N10 \]
Taxi stand location \[ N11 \]

Table 2. Information needs of WISETRIP

The pre-trip information needs basically refer to the provision of personalized travel information, the on-line booking of the entire journey, and the alerting of users for any disruption of the itinerary planned by the user. The need for provision of personalized information to the users implies the functional need to create and retrieve a personal profile anytime & anywhere.

- On-line booking is taken into account through the need of accessing existing booking services through the internet (N3). Covering the need for on-line journey booking through WISETRIP was deemed outside the scope of the project.
- Alerting the user, at the pre-trip phase, for any disruption in his/her journey planned through the system (N4), was identified as a major need by many manager/owners of the existing journey planners included in the survey.
- In addition, a major need for the international traveller relates to his/her difficulty in finding his/her way during transfers between modes in foreign counties. In this context, there is a need for the detailed description of the part of the itinerary covering foreign countries with specialized information on how to transfer between modes (N2).
- The major information needs identified for the on-route phase of a journey basically relate to the capability of the user to replan his/her journey in case of a cancellation in a subsequent transport leg (N5)
- Real-time alerts about any disruption of transport services (N6)
- Delays (N7) affecting the journey plan/itinerary
- In addition, the need for provision of reminders regarding next transport service, departure time and boarding location (e.g. platform) for various stages of the journey (N8) has also been taken into account.

Finally the information needs identified for the post-trip phase, include the specification of the nearest location of points for tourist information (N9), car-hire (N10), and taxi-stand (N11).
4. SYSTEM CONSTRAINTS AND LIMITATIONS

According to the proposed methodological framework for the development of WISETRIP, the design of the system will be based on identifying and integrating the passenger information and journey planning functionalities that best fit to the user needs and comply with the relevant technological, institutional, and business constraints. This section presents the major categories of constraints that could be encountered in the development and implementation of WISETRIP.

4.1. Technological Constraints

This section lists technological and functional matters (either constraints or considerations) that will affect the level of feasibility of the functional and architectural design choices to be made for the integration of participating Journey Planners into the WISETRIP system. It should be pointed out that the technical approach adopted in WISETRIP should involve a generic interface rather than a limited interface which only satisfies the integration need of the five Journey Planners of WISETRIP.

The result of this task is contributing to:

- Task 2.1, providing contribution towards the consideration of technological issues and possible identification of constraints and
- Task 2.3, contributing to the analysis of the problems to be resolved in order to integrate participating Journey Planners into WISETRIP, indicating also possible solutions.

This section will go through the recorded considerations relevant to technical issues, as well as comment upon possible design and architectural choices that could become solutions to be employed during integration. The information reported in this section has been generated from a survey of experience of the functional and technological issues surrounding the integration of Journey Planners into the WISETRIP platform which is available at Appendix III.

The content of the survey covered the following main issues:

- Functional Constraints regarding alerting support, regular update on preferred questions, handling early-made requests, report real-time and incident information, format of query input (location, route, time parameters), sorting and filtering of responses, spatial and naming proximity,
- Technological constraints including performance issues, technologies utilized and openness of systems
- Data Constraints including representation and format of data, multilingual support, coverage of international transport terminal nodes.

The integration of different Journey Planning systems involves finding methods to overcome non-uniformities as far as concerns: functionality, data and technologies used. Ways to overcome these difficulties could be either based upon development of adaptation patches / modules into Journey Planner interfaces, or by adapting the WISETRIP functionality in a way to achieve the desired functionality in a transparent way.

4.1.1. Functional Constraints

Alerting not always supported

Though WISETRIP aims to provide alerting service, this is not the case for each participating Journey Planner. It is important for participating journey planners to provide alerting support for a specific change or event that causes cancellation or delays into a specific trip. For that reason, it is desirable for a participating Journey Planner to generate such alerts when
The Use Case explored within the functionality survey of participating JPs is shown below followed by brief specific comments relating to each JP participating in WISETRIP.

**USE CASE 1 : Alerting**

Our USER has selected an international trip from loc.A to loc.B which involves the following path:

- **H1**: Loc.A – bus (suburban route) – Loc.X
- **H2**: Loc.X – air (international route) – Loc Y
- **H3**: Loc.Y – walk – Loc Y.train station
- **H4**: Loc Y.train station – railway - Loc.B

- **H1** sourced from JP1
- **H2** defined by the user
- **H4** sourced from JP2

The railway trip from Loc Y to Loc B has been cancelled. This happened sometime before the trip from Loc A started or even while on trip from Loc.A to Loc Y. Next trip scheduled is one and a half hours later. USER receives an alert message into his mobile notifying him for the change and the new arrangement that is proposed.

Assume your JP is JP2. Can your JP provide an alert about a cancellation or modification of a trip? i.e. a modification of a trip might be related to a change of the vessel, train number or else. Do you plan to develop such functionality?

**BusBussola (the ATAF-JP):**

- BusBussola is the ATAF-JP which provides the travel information related to the urban public transport service in the Florence Metropolitan Area. BusBussola-JP is accessible by web connection and is set on the basis of the current time-tables for working days, Saturday and Sunday of the transport service operated by ATAF. Time-tables come updated every 20-30 days depending on the different period during the year (winter, summer, school periods, etc). Since there is not any alert message to the travellers related to the modification of the trip time-tables travellers can verify the time-tables through the web site connection (a specific sector of the web site contains all the time tables of all the lines) or, approaching the bus stops, by reading the paper time-tables displayed at the bus stop.

- There is no plan to provide such a service in the future. The ATAF JP is designed in order to give information about the service scheduled in the day chosen by the customer. Every time the customer can choose the day and the time when he would like to have information about a journey. It is a static query that can be modified every time.

**Destia.Fi:**

- Considers that alerting is a good idea, which however is not within the production plans
- The idea should be considered and such service could be offered for registered users in the future

[www.travelinescotland.com](http://www.travelinescotland.com)

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1 **Selection** means that the user has been presented with various options from the WISETRIP user interface but he chose one of them and he has registered his details for this specific trip so as to get informed about it before/after/during the trip path. This is one of the personalized scenarios.
Alerting is not provided, but the response indicated the TrainTracker™ system (www.thetrainline.co.uk). TrainTracker™ can be accessed by calling a specific telephone number. TrainTracker™ offers live arrival / departure board information over the phone.

TrainTracker™ uses speech recognition, allowing you to say what you want

- Looks up estimated train times and delivers these to you by automated voice
- Reads you a station-specific status message
- Has up-to-date real-time information from the live departures and arrivals boards
- Costs only 10p per minute from a land-line, charges for calls from mobile phones will vary (details may be obtained from your network provider).

There are a number of TrainTracker™ services, including TrainTracker Text™ and TrainTracker™ for specific busy stations. TrainTracker Text™ provides live departure & arrival information direct to your mobile by texting your station or journey to 84950 (guidelines available on http://nationalrail.co.uk/passenger_services/info_on_the_move/traintrackertext.htm)

HZCB

Alerting is not provided, though it should be provided in the future. No plan is indicated.

ENOSIS

In case of airline and ferry schedules, the ENOSIS JP provides alerts (SMS) about the cancellation of the trip to a registered user for a selected trip. It also provides alerting information when a change happens in attributes like vessel name, new departure time, etc.

CAMPSA

This JP is a single mode Journey Planner and does not provide dynamic information of any form while the user is travelling, but there is a specific section of the web site called “Status of the Roads” in which the user can check the status of the roads in real time. The alerting functionality described is not projected.

CTM

When there is an incident in any of the transport modes that are part of the JP, it is announced in a specific section of the website called “INCIDENTS”. This information is not sent to the user, which means that if the user is on trip and has no access to the internet through a mobile device, he won’t be aware of the incident, and won’t be able to plan an alternative trip.

Regular Update might not be available

The WISETRIP personalised service might be adjusted to the need of the traveller who either is a frequent traveller via a specific route or plans a trip far in advance and wants to have regularly updated information on the available solutions. Regular updating and registration of a route might not be supported from one or more participating Journey Planners.

USE CASE 2: Regular Update of a specific question

A person residing at area Loc.A is a frequent visitor to place at Loc.B which is 150 kms away. It is intended that WISETRIP can serve this personalised need by enabling the user to register this request and ask for a periodical monitor or alerting of new data. Is there any relevant service of your JP addressing the need of frequent
update/monitor of the available solutions?

BusBussola by ATAF-JP:

- There is not such a service and it is not projected for the BusBussola JP.

Destia.Fi:

- Considers it as a good idea, which however is not within the projected plans but should be considered as a service to be offered for registered users in the future.

Destia.Fi:

- www.travelinescotland.com

- It is possible to get information sent to your computer, PDA or mobile phone for the trip. However, updating of information is restricted by data protection regulations governing how long trip requests can be stored. Daily disruptions, delays etc can be catered for however permanent changes would require further request.

HZCB

- There is not such a service now, though it is planned to be because it’s useful for people who drive to go frequently between Loc. A and Loc. B.

ENOSIS

- There is not such a service now. However, ENOSIS could allow users to register for a specific trip (a user could also select his/her preferred transportation means) and for a specific time period (specified again by the user) he could be informed on a weekly (or monthly) basis about available solutions via email. Such a functionality is not provided yet but could be easily developed.

CAMPSA

- There is not such a service and is not projected

CTM

- There is not such a service and is not projected

Handling Early Requests is not the case

Dealing with international trips, might reveal the case of non-scheduled trips which however are expected to be decided and published from a JP within the future. Registration of such requests so that an update is given when available could be a key service, which most of the Journey Planners do not yet support.

- **USE CASE 3: Personalisation Case – Dealing with seasonal data that are not available at a specific time**

For example in Greece, islands are highly visited during the summer. However, people cannot begin to plan their holidays until the ferry/airline schedules are announced. The WISETRIP Journey Planner is expected to register a specific request and keep the user updated as soon as there is an answer for him. Is there a similar requirement in your area / nation? How do you deal with it? Does your system provide a special service for it? When such a hop is encountered (i.e. a user asks in January to move from Helsinki to island of Amorgos for a specific date. The answer is NULL but in two months there will be an available answer) WISETRIP should somehow motivate the user to subscribe the request along with his details for a future answer.

BusBussola by ATAF-JP:
There is not such a service and it is not projected for the BusBussola JP. Possible answers for the customers can be provided only for scheduled time tables.

Destia.Fi:
- Journey.Fi offers timetables c.a. one month beforehand. The problem is familiar in Finland every time a summer / winter season begins. No specific actions are taken yet.
- The idea should be considered as a service to be offered for registered users in the future.

www.travelinescotland.com
- Requests are not held on record. At present the system provides responses to all queries at time of request. Responses indicate that there is either an answer and given details for the query or displays that a trip response is not available. UK Data Protection legislation also restricts the details and length of time relevant information can be stored.
- It will definitely be a service to be provided in the future; particularly useful for tourists planning hill-walking and cycling holidays in Scotland.

HZCB
- There is not this form of requirement yet. And there is not a plan to develop this because this form of demand is not considered important. People often check the latest information on the Internet for their holiday.

ENOSIS
- In Greece such cases are frequent, however ENOSIS JP does not provide a service for it. The user has to come back and make a new request after the announcement of schedules, though he/she is not aware when this announcement takes place. Most of the users in these cases ask for the help of a travel agent, who will keep his/her request (if the user is a customer) and inform him/her later on. It was not in the ENOSIS plans to provide such functionality, however it is a service that could be developed.

Campsa
- There is not a similar requirement in the CAMPSA JP and it is not projected in the future.

CTM
- There is not a similar requirement in the CTM JP since the scope is regional and based on the daily needs of the user regarding basically the public transport network – although combined with some private services to cover the interurban routes-. At the time being, it is not projected to provide such service.

Real-time traffic or incident information
Provision of real-time traffic or incident information is essential for JP requests as well as for registered users who have selected update information on a specific trip. WISETRIP personalised scenarios might engage this need, which won’t be available from all participating Journey Planners.

- **USE CASE 4: Real Time Traffic or Incident Information**
Our user is travelling along the route he has already registered through WISETRIP. However he uses his mobile interface to get real-time traffic information for a specific urban hop of his trip. Can your JP provide such information? Can the JP report an incident related to the selected route?
BusBussola by ATAF-JP:
- Now, ATAF-JP does not have such a service. It could be investigated in the future, but a more realistic objective is to develop the information system by SMS. ATAF has, for its entire bus fleet, an AVM (Automatic Vehicle Monitoring) system: with this system ATAF knows the actual position of the bus operating the service. ATAF is testing a new system to give information to the costumers by SMS about the real time performance of transit timetables (taking into account the possible delays). It is a dynamic information system, with which the customers can have information while they are waiting for the buses.

Destia.Fi:
- Such a service is not (yet) available. The idea should be considered as a service to be offered for registered users in the future

ATF (www.travelinescotland.com)
- Today, the JP can provide traffic information to phone or PDA. To view the site on the PDA one should simply browse the Traffic Scotland web site. The PDA should point to www.trafficscotland.org/pda. Details are not route specific to the requested route but are sent direct advising on problems throughout Scotland.
- Service as described within the use case would be extremely useful.

HZCB
- Such a service is not available now. When there will be a real-time traffic information, HZCB can provide it to the users in co-operation with the mobile network operation company.

ENOSIS
- ENOSIS JP does not have real-time traffic information for urban routes. In case the needed information is available to ENOSIS the system is ready to alert all subscribed users for the specific route.

CAMPESA
- No, CAMPESA JP does not provide such information and it is even projected for the near future.

CTM
- No, CTM JP does not provide such information. It focuses on public transport itineraries and, although traffic information affects the performance of the bus schedules, this type of information is not projected to be provided for the end user.

Query Input – certain location or route
The WISETRIP preference is to process input to locate to the position of the user (it might be the current position) in order to provide services within personalised scenarios. However, not all Journey Planners support this form of input. There could be the case where the current position of the user ((X,Y co-ordinates or street address) specifies one of the criteria for a certain query so that location-based service/data are triggered.

- Can the Journey Planner take as an input:
  a. the current position of the user (X,Y coordinates or street address) and
  b. the current route
and provide more data (incident, traffic, information about stops and terminals)
- ATAF does not convey certain location information. It could be investigated for the future provision.
- DESTIA can take as an input the current position. Additional information about stops can be provided if the data is available.
- ATF can take as input street information but not GPS coordinates.
- HZCB provides for input, location but not specific route. And provides information about stops and terminals as well as traffic condition. It is planned to provide incident information.
- ENOSIS does not provide location based information. The ENOSIS team has worked with location based services and could provide such functionality but there not any specific time plans on that. In that case ENOSIS should also have real-time information (incident, traffic etc) and for the time being such content is not available.
- CAMPSA does not provide such a personalised information about incidents, but the user can check the status of the road network in real time through a link in a specific section of the site, called “road status”. It is not projected to provide such functionality.
- CTM does not provide such a personalised information and it is not projected for the future. However, it does inform the user about the incidents by approving information on the specific section of the site called “INCIDENTS”.

**Query Input – Time Criteria**

A WISETRIP query might be time specific relating to arrival time in a set location out of the travellers home country. Input might incur a time definition (limits, conditions, etc) that might not be compliant to the time specification of a participating Journey Planner. The time criteria supported by the participating as well as other JPs (except CAMPSA) are listed in the table below.

<table>
<thead>
<tr>
<th>Time Criteria</th>
<th>ATAF</th>
<th>DESTIA</th>
<th>ATF</th>
<th>HZCB</th>
<th>ENOSIS</th>
<th>CTM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exact Departure time</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
</tr>
<tr>
<td>Departure time before X</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Departure time after X</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Departure time between X and Y</td>
<td>☑</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Arrival time before X</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
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<td>☑</td>
<td>☐</td>
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<tr>
<td>Arrival time after X</td>
<td>☐</td>
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<td>☐</td>
</tr>
<tr>
<td>Arrival time between X and Y</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Total Drip Duration less than X</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Combinations supported</td>
<td>None</td>
<td>See <a href="http://www.transportdirect.com">www.transportdirect.com</a> example</td>
<td>1-5, 1-7</td>
<td>1-8, 3-5</td>
<td>3-7, 3-8</td>
<td>4-5, 4-7</td>
</tr>
</tbody>
</table>

11/09/2009 © The WISETRIP Consortium Page [27] of [177]
Table 3. Time criteria supported by the Journey Planners participating in WISETRIP.

Query Output – Sorting & Filtering
Though not a constraint, the sorting of journey planner answers according to criteria might be required. But, in the case of filtering, it is required to know in advance whether default filtering is applicable at each participating Journey Planner or whether a specific filter should be applied for a specific Journey Planner.

Sorting - Various sorting criteria can be applied into trip query responses. It might be the case that a default sorting policy is applied or the user selects the sorting in advance or he/she sorts responses at the presentation phase through the interface.

ATAF
- Following the user request, the system calculates some different possibilities to reach the destination. The user can select the most appropriate solution to meet their needs.

DESTIA
- Time - Default: departure time after the given time
  OR
  arrival time before the given time
More specific parameters that can be used in the search and which also define the sorting type are:
- walking speed;
- transfer safety margin;
- fastest route type;
- route with least transfers; or
- route with least walking

www.travelinescotland.com
- ATF provided the example from www.travelinescotland.com showing various sorting and filtering criteria applied. Mainly, the following criteria can be applied: public transport vs car route, types of transport preferred (train, metro, ferry, bus/coach, tram/light rail, plane within Scotland only), speed of making changes, walking time that can be afforded, intermediate node, quickest journey, road avoidance, fuel consumption, toll avoidance etc.

HZCB – If we enumerate criteria as follows:
1. Exact Departure time
2. Departure time before X
3. Departure time after X
4. Departure time between X and Y
5. Arrival time before X
6. Arrival time after X
7. Arrival time between X and Y
8. Total Drip Duration less than X
the possible sorting criteria are 1-5,1-7,1-8,3-5,3-7,3-8,4-5,4-7,4-8 and can be applied either at query definition phase or within the results interface. Default criteria are 2-7.

ENOSIS - Sorting criteria that could be applied only during the presentation phase are related to date, duration, number of hops. By default ENOSIS uses the date (departure time) criterion. User can also filter routes by means of transport.

CAMPSA - The user can apply several sorting criteria before the route is calculated. These sorting criteria are as follows:
  o The shortest route
  o The fastest route
  o Highways preferred

Beside that, the user can also indicate if he/she wishes to avoid to pay highways or roads with high congestion. The default sorting criteria applied in this JP are: The fastest route and not to avoid anything.

CTM - The user can apply several sorting criteria both in advance or during the presentation phase. These criteria are divided into two types:
  o Transportation mode
  o Only metro/tramway
  o Only bus
  o Only train
  o All modes
  o Calculation criteria
  o Minimum interchanges
  o Optimum route
  o Fastest route

The default sorting criteria applied in this JP are: All modes and Optimum route.

Filtering - Apart from sorting, filtering might be applied based on options defined at the query phase or at the final interface level.

ATAF
There is not any further criteria to filter the trip than those applied by the users at the first interface level, e.g., the users can choose some parameters in order to optimize the journey calculation according their preferences. The possibilities of choice are:
- Less changes
- Shortest walking distance
- No preferences

DESTIA
In the near future transport mode can be used as a filtering criteria (i.e. the user can select that he/she only wants to use trains/buses/…)

www.transportdirect.com
- ATF provided the example illustrated above (www.transportdirect.com) (see paragraph about sorting) showing the sorting and filtering criteria applied.

HZCB - Filtering can be applied based on least duration, least hops, least cost

ENOSIS – It applied automatic filtering based on the following ‘rules’
- Duration of urban routes cannot be more than 3 hours
- For interurban routes the difference between departure and arrival date cannot be more than one day which is normal within Greece.

CAMPSA - This JP gives the user the possibility to use two different filters:
The user can indicate if he/she wishes to avoid pay highways
- Or if he/she wishes to avoid roads with high congestion

CTM - This JP does not use such form of filters. But the calculation criteria can be chosen among the following options:
- Minimum interchanges
- Optimum route
- Fastest route

Dealing with proximity
A Journey Planner system might face cases where input query parameters might not show rigid term (time, position, location), and the case should be handled carefully: a system might either ask the user to re-define and reach a more specific term, or assume a wider range of terms/parameter values or recognize synonyms, identify spelling errors etc. WISETRIP could also face such cases, but its performance could depend upon how and whether the participating Journey Planners manage such issues. The following question has been sent to participating Journey Planners:

- How does the Journey Planner deal with proximity or uncertainty in the following cases?

Spatial proximity – a specified location is not within the set of transport network nodes covered. However an answer can be given using a nearby location/node.

Naming proximity – the name of the location specified is not exactly the one stored though it refers to the same location (i.e. it is a synonym or there is a spelling differentiation/error such as Thira - Santorini, Helsinki - Elsinki, etc)

Time proximity – though the JP for a specified time window does not give an answer or gives a set of answers, there are

Responses follow below:

ATALF
The JP provides the following response in such cases:
- the name of the street is wrong: an alert message appears and invites the users to provide a new address that is correct.
- the name of the street lacks identification: an alert message appears and invites the users to select one of the proposed addresses.

DESTIA
Spatial proximity: The given address must always be accessible either by walking or by some transport mode. XY location is projected to the nearest possible road address (a vector).
Naming proximity: The beginning of the name must be correct. The name search is performed based on the text the user enters in the search field - names that begin with the given text are taken into account.
Time proximity - The aim is to offer the timetables approx. one month beforehand.

ATF
Each bus stop interchange in the UK has been grid referenced and named. This allows the user to select the stop from drop down menus. Examples can be found in www.transportdirect.com.

HZCB - The users choose the location on the map or choose the names of the two roads that the intersection belongs to.

ENOSIS – Proximity is not considered neither managed through the interface at the query definition phase.

CAMPSA

Spatial proximity: The CAMPSA JP is a single mode journey planner providing information about road routes. If the specified location is not within the set of known addresses covered by the JP, the trip planner will give the possibility to choose among a few known addresses (main streets usually) of the city indicated as an input.

Naming proximity: This JP allows the user to specify the journey origin and destiny by indicating the address (country, city and/or street) either by writing the complete name of the street or by introducing the first few letters of the address (city, street, avenue or square), a set of options matching with the query are shown to the user among which he will choose the correct one.

Time proximity: The user does not have the possibility to introduce a departing time so no time proximity options are available on this JP.

CTM

Spatial proximity: In the case that the specified location is not within the set of transport network nodes covered, the JP calculates the nearest node and tells the user how long it would take to walk from the initial position to the nearest node.

Naming proximity: This JP allows the user to specify the journey origin and destiny through several options. The user can choose to start the journey from a train station, a metro station, or from a place of interest. In these cases the user can choose from a set of options, so there is no place for uncertainty.

The user can also choose his/her origin/destiny by indicating the exact address (street and number) either by writing the complete name of the street or by introducing the first letters of the street, avenue or square, in this case a set of options matching with the query are shown to the user among which he/she will choose the correct one.

Time proximity: The user has to introduce the departing time and the JP calculates the best route according to the time schedules. No time proximity options are available on this JP.

4.1.2. Technology & Performance Constraints

Performance

When a JP is taking part in a composed process it is important that its performance is predictable and consistent. Whenever bad performance is monitored this could be a case of bad effect passing forward to WISETRIP operation and for this reason it would be useful to know in advance – when if possible – such performance degradation occurs, when it occurs and how it can be avoided. In the worst case scenario the average response time as well as the cases of bad performance of the participating systems, to the most frequent Journey Planner questions is as below:

- ATAF - Almost 5 to 10 seconds for each query (when the web connection is not overloaded). When the web connection is overloaded, the response time can even exceed 5 minutes.
- **DESTIA**  - In practice less than one second. There is no information recorded for significant performance degradation that made the system unacceptable under certain circumstances.
- **ATF**  - No significant performance degradation cases have been reported.
- **HZBC**  - N/A
- **ENOSIS**  - In case of a pure interurban or a pure urban trip the system responses in about 6–9 sec. In case of a multimodal trip the response time might reach up to about 30-40 sec. Maximum response time ever monitored was 78 secs. Usually we have such bad responses in cases we have many alternative routes (e.g. 8 or 10 alternatives) that include both interurban and urban trip.
- **CAMPSA**  - The average response time of the JP depend on the query type. It is usually higher if the route is international.
- **CTM**  - Average response time is less than one second

**Technologies Utilized**
Integration of existing Journey Planners with WISETRIP would be easier if technologies utilized were the same. But normally this is not the case. Various technologies engaged in the developed and operating Journey Planners are indicated below. The list implies that WISETRIP will have to use necessary technological know-how when interfacing with JPs. Such technologies are related to
- Programming Language/Framework
- Operating System
- RDBMS

**ATAF**
**Programming Languages:**
Mapserver: C++
WebApplication: **ASP 2.0**
WebServer: **MS IIS**
**Operating System**
Windows Server 2003

**RDBMS:**
MS SQL-Server 2005

**DESTIA**
**Programming Languages:**
Java, C++
**Operating System**
Windows, Linux
**RDBMS:**
MySQL

**HZBC**
**Programming Languages:**
Java
**Operating System**
Windows
**RDBMS:**
Oracle

- **ENOSIS**

**Programming Environment:**
J2EE on JAVA SE 1.4 (JRE 1.4.2_10)
Servlet container supporting the servlet specification 2.3 (Apache Tomcat 5.0.27). For the web service ENOSIS used Apache Maven 1.0.2 (we plan to go on with Maven 2.x)

**RDBMS:**
PostgreSQL 7.4.13

**Openness**

In order to integrate participating JPs into a unified-like system this will require participating systems to have open ways to interface with other systems. It might be required either to receive queries from external systems and other WISETRIP modules or provide answers to external interfaces

- ATAF system can interface to other system so that to receive queries from external systems as well as provide answers to external interfaces. It is based on an XML interface.
- DESTIA has multiple interfaces. In order to provide an answer to an external service, the service has to gather the answer from XML. The queries (parameters) are given in URL (http).
- HZBC N/A
- The ENOSIS system can interface to other systems to receive queries from external systems as well as provide answers to external interfaces. This is the case with the voice portal that has been developed. It is based on an XML interface.

### 4.1.3. Data Constraints

**Data Representation differs**

In terms of the unified integration of Journey Planners the major constraint is derived from the fact that there is not unified data representation across the variant systems. Data representation technologies differ from JP to JP. The participating JPs were asked to provide information and –if possible- a short analysis related to data representation and standards which (if any) are utilised within

a. query response  
b. query data  
c. stored data & representation of transport network  
d. real time, traffic & incident information

<table>
<thead>
<tr>
<th>JP</th>
<th>Data representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATAF</td>
<td>Paths and nodes of the transport network are represented by shape files managed with GIS system. The timetables are a system of Oracle tables that take into account the different parameters of the service.</td>
</tr>
<tr>
<td>DESTIA</td>
<td>a) XML for query response</td>
</tr>
</tbody>
</table>
b) http POST/GET for query data
   c) XML for stored data and representation of transport network
   d) Not available

ATF -

HZCB  The answer for data representation has been positive. But no standard has been mentioned.

ENOSIS  No specific standard is followed.

Table 4. Data representation for each journey planner participating in WISETRIP.

More specifically:

ATAF

- The transport network is represented by paths and nodes. Paths are the routes followed by the transport lines and Nodes are the bus stops where the users can be picked up and dropped off the bus. Paths and nodes are geo referenced to the used system of coordinates.

DESTIA

- XML is used for the representation of the network. Detailed documentation (schema) is available on request.

HZCB

- Data representation is GIS-based. More details will be specified as the development project of the JP of Hangzhou is progressing.

ENOSIS

- The ENOSIS transportation network includes vectors representing urban transport lines consisting of nodes (start, terminal and intermediate). With the help of this representation it is possible to find and illustrate a route between nodes of the network and calculate time across route points. The appropriate table structure and the necessary algorithms applied in the data base content of ENOSIS and the databases of the sub-modules of ENOSIS (urban and interurban Journey Planner) rely on the required representation which can be detailed if necessary.

Multilinguality

Another constraint is related to multilingual support. Not all Journey Planners are multilingual. For the integration result to be multilingual an adaptation mechanism should be employed. Participating JPs are mostly available in their national language, while a few of them also do provide English as an alternative option. Therefore, dynamic lingual adaptation will be a key functional requirement for the architecture.

International Gates must be included

It will not be possible to include international paths within WISETRIP journey planning unless participating journey planners include nodes with international transport gates and links into the covered transport network. It is important to show complete international multimodal paths and for this a Journey Planner which includes one or more international travel network gates (port, railway terminals, airports, etc) could be more easily integrated into WISETRIP scenarios. The table below illustrates the international nodes covered in the participating JPs.
International Node

<table>
<thead>
<tr>
<th>JP</th>
<th>International Node</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATAF</td>
<td>The network covered by the BusBussola JP includes the railways station of the Florence Metropolitan Area (the railway services are operated by Trenitalia) and the international airport of Florence &quot;A.Vespucci&quot;. Obviously near these gates there are many lines of the local public transport service managed by ATAF and available through the BusBussola JP.</td>
</tr>
<tr>
<td>DESTIA</td>
<td>All international travel network gates of Finland (e.g. airports, ports, and railway and bus terminals with international connections) are included in Journey.fi service, but the international connections are not available in the service (thus, it is not possible to do searches outside Finnish borders).</td>
</tr>
<tr>
<td>ATF</td>
<td>From <a href="http://www.traveline.org.uk">www.traveline.org.uk</a> you can be redirected to <a href="http://www.thetrainline.com">www.thetrainline.com</a>, where links to Eurostar and International Train sites etc are possible providing timetable and seat booking opportunities. International airports and ports are also included i.e. Aberdeen Airport.</td>
</tr>
<tr>
<td>HZCB</td>
<td>Xiaoshan Airport is covered, including also urban links towards it.</td>
</tr>
</tbody>
</table>
| ENOSIS | ENOSIS covers the following international gates:  
Airports: Athens (urban transport is also available), Heraklion, Thessaloniki  
Ports: Igoumenitsa, Patra, Corfu  
ENOSIS JP doesn’t support international routes but of course it covers the urban links to Athens airport and all domestic connections between the abovementioned gates. |

Table 5. International nodes covered by each Journey planner participating in WISETRIP.

4.2. **Legal and Institutional Constraints**

4.2.1. Introduction

The development of Journey Planners (JPs) has historically fallen into two broad categories, the first being (self) promotion of single mode or single company operation, the second arising from Government actions to create links between (all) modes to give access to a clear reference point for mobility solutions.

In Europe the operation of Public Transport Services varies from country to country. In some cases services are provided solely by Government-owned organizations, in others the market is completely deregulated. These issues pose a challenge for the WISETRIP project as recognition of these variables must be taken into the design of the concept of an Interconnected Journey Planner System.

This section discusses the legal and institutional constraints to the wider implementation of JP systems whilst recognizing that these cannot be considered in isolation of the technological constraints and challenges. To begin with a number of key challenges are identified under the headings of data, legislation and technology; following this the remainder of the section discusses the findings of a survey of international experience specifically designed to investigate the legal and institutional constraints.

Data

The ability of WISETRIP to personalize data requests will also raise the question of data protection issues on how these requests are stored and monitored. For example, there have been issues surrounding restrictions on data stored from London’s ‘Oyster card’ system. These issues, whether actual or perceived must be addressed. The quality and consistency of transport data also differs from country to country and from company to company. For example, some use 24 hour and some 12 hour clock for timetable display, some display time
of services, others frequency. Language differences between countries also pose a potential barrier.

Legislation
In the delivery of multi-modal information it is essential to recognize the wide range of governing legislation, some national, others local and some covering all Europe. Will it be possible to get existing JPs to work together to share information in a set format to aid the customer? What are the operating systems that are currently used and are they all compatible? In a deregulated environment where operators can compete freely and charge differing fares at different times, it is difficult to persuade organizations to share their “business model” requirements in a competitive environment. There has to be an element of trust established between those operating and delivering services, the end user and the technical supplier of the JP. There may be an Office of Fair Trading or monopoly and mergers implications to be referred to in the design of a common framework for JP implementation.

Technology
What are the technologies used to communicate with end users and are they similar across all nation states? The use of mobile communication technologies is central to the success of WISETRIP. In Europe however there are great differences in the quality, standard and availability of mobile phone networks. Roaming networks are common in Europe; in the UK however each company operates its own network. This can cause great problems. The customer has to be confident that their personalized JP will work where ever they are in their own country or when travelling globally.

Mobile internet through 3G adoption is predicted to be highest in Austria, Italy, the UK, and the Nordic countries. More than 60% of mobile phone users in these countries will have either a 3G or 3.5G handset by the end of 2010. These countries will also be the quickest to adopt 3.5G, reaching penetration rates of more than 25% by the end of 2013. France, Germany, and the Netherlands are “middle-of-the-road” countries. By the end of 2010, 3G and 3.5G penetration rates in these countries will range from 50% to 60%. However, by the end of 2013, these countries will be on par with the leading countries in terms of overall 3G adoption, albeit with a lower share of 3.5G phones — at around 20% of mobile phone users. Belgium, Greece, and Ireland will be slow to catch up. Less than 50% of consumers in these countries will have either a 3G or 3.5G handset by the end of 2010 and by the end of 2013 it is estimated that less than 20% of mobile phone users will have a 3.5G device.

4.2.2. Existing experiences

From the point of view of legal and institutional background where existing experiences of Journey Planners (JPs) have been developed, the WISETRIP project has carried out a specific investigation of international experiences. The investigated JPs span the national borders of the EU, China and Japan. Copy of the questionnaire can be found at Appendix III. A summary of consolidated results from the survey is also described in Appendix III.

From the survey’s respondents it is possible to build awareness about these issues, and to discover some characteristics that can affect the development of JPs. The WISETRIP JP platform is taking into account the results of the survey in order to define the base structure of the project platform.

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2 For example in India there are now over 250 million mobile-phone users, but only 3.5 million broadband internet connections. Mobile penetration rates also vary considerably ranging from 146% in Italy to 84% in France, 42% in China and 26% in India.

Institutional and organisational issues

1. Start up

In most cases the decision to initiate a JP comes from the need for improvement of information on both public and private transport services and travel possibilities. In the case of public transport operators who have initiated JPs, it is important to encourage people using public transport services to improve their revenue generation; for local authorities (through the public transport manager) the motivation is to reduce traffic congestion. In other cases, the provision of transport data via a JP forms part of the commitment between the transport operators and the local authority/ies. For example, in the Florence Metropolitan Area the realization of the JP came from ATAF (the public transport operator) with the objectives to increase information and accessibility for the users' service and the authority of the Province of Florence.

2. Funding

Funding of JPs varies across the sites investigated and is closely related to the entity that has financed the development of the JP. In some cases the public bodies (including private firms joined by the public authorities), both at local and national level takes charge of the JP financing although it was seen from other experiences that a co-financing among public and private entities has been suitable and successful. In other cases the private entities have financed the overall JP development. As an example Mobiliter (the Public Transport JP in Emilia Romagna Region) is publicly funded by the Region. The development of a public transport JP is often one of the institutional objectives of a public body in order to facilitate and encourage the use of public transport services. Private entities finance JPs in the case of independent JPs (for example Megabus in the UK) improves the accessibility and the overall information for the users for enhancing their transport service.

3. Property

Concerning the property of the data and of the JP, two distinct possibilities come from the framework of the institutional system. In fact, if the JP is developed by a single transport operator, it often maintains the property of both the data and the JP. If the JP provides information about a wider area coverage incorporating many transport operators, the property of the data belongs to the transport companies whilst the JP is owned by the manager of the system (e.g. Google Transit); sometimes this may be coincident with the manager of the overall Public Transport System (e.g. Mobiliter in the experience of the Emilia Romagna Region). Starting from this difference the data provision also shows some diversities; in fact if the JP manager is also the public transport manager the data provision is mandatory for the single transport company, as indicated above. In the case of a JP developed by a private body it (obviously) maintains both the property of the data and of the JP.

Development and maintenance

1. Software
Regarding the software and taking into account the different aspects such as copyright and maintenance it is possible to keep the differences as seen above about the property of data and the JP. In fact, the transport companies or public transport managers who own and manage the JP may have a software license from a software house responsible for development of a specific JP. In some experiences of Italian, UK and Chinese Journey Planners, the copyright of the JP remains with the firm which has developed the software and which is also the JP manager. Italian experience of Google Transit JP provides an example: Google is the JP owner and manager of the data received by the transport operators through the agreement with the Province of Florence. Google gives to the beneficiaries of the service (the Province of Florence as public transport manager in the area) a personal and non-exclusive licence to use the software provided by Google itself. On the other side, the transport manager in Florence gives to Google a non-exclusive license in displaying the transport data.

In the case of licensed use of the software to the JP owner, it is usually agreed that the software house will take care of the maintenance of the JP, at least during the warranty period (cost-free). Unless agreed otherwise in writing the contract to use the license of the software and the maintenance costs of the JP is negotiated among parties after the warranty period. The JP owner is not obliged to sign a maintenance contract with the software house at the end of the warranty period (even if it usually happens) and it can decide to carry out the maintenance itself. For Busbussola JP ATAF bought the software and the maintenance is carried out by a software house. When it is the case that the JP is owned by the software house or by the service provider (Google), it is the same subject to sustain the maintenance.

2. Management and Responsibility

Concerning the data management and the responsibility for any lack or wrong information displayed in the JP, there are two main possibilities: when the JP manager is also the data provider, it is certainly responsible for the entire process (in this case all the JP is developed by private bodies); when the JP manager is not the data provider, it is usually explained in the terms and conditions of the JP contract that all the attention will be paid in displaying and updating of information, but it makes no representations or warranties regarding the accuracy or completeness of the information. In the case of Google Transit for the Italian sites the responsibilities of the accuracy and completeness of data depends on the data provider.

4.2.3. Conclusions and implication for WISETRIP

The development of Journey Planners (JPs) has followed very different paths depending on different issues (funding, property of data and software, maintenance and responsibility etc). One of the main objectives is to ensure that the implementation of a JP does satisfy key stakeholders (e.g. improve accessibility and information to the public transport services, give information about the overall public transport system in an area, etc). Opening the “JP box” has shown big differences between different approaches and one of the challenges of WISETRIP is to understand these diversities to define the best way of developing an Interconnected Journey Planner System which can take into account the positive aspects of the participating systems.

4.3. Business oriented Constraints
It is necessary for WISETRIP to consider exploitation and several issues should be surveyed in advance in order to avoid careless and unsuccessful attempts towards deployment. Therefore, within the initial phase of the WISETRIP project, business considerations are necessary to be stated and taken into account within the system definition as well as the exploitation planning tasks. Business constraints might show those prerequisites in terms of system quality and size, legal requirements and financial models that could assure route of WISETRIP findings towards safer exploitation.

4.3.1. Thoughts on Business Preconditions

Content Completion

WISETRIP commercial success and market acceptance requires that its initial content satisfy criteria such as:

A. **substantial geographical coverage**, meaning that the set of destinations covered by the participating transport networks constitute a ‘critical mass’ and satisfy large populations which normally means that it covers an area of frequent international travel requirements. Such an area could be defined as a set of neighbouring countries i.e. Scandinavia, BENELUX, Balkan peninsula countries, or countries which constitute frequent travel options i.e. Northern Europe countries and Mediterranean countries where tourism and business paths are conveying millions of travelers.

B. **completeness of content, reliability of information and multimodality of transport means.** The most important requirement is information to derive from the on-line systems of transportation so that it is reliable and updated. Even when geographical coverage is achieved, if a specific means of transport is missing that will reduce the acceptance of the system.

If the system is advertised with insufficient content or with inaccurate information, then it will be disdained immediately and any promotion effort will have no result.

Moreover, multilingualism and content enrichment (with information other than routes) are fundamental axes of content and accordingly of service development and in particular:

- **Support of multi-language content**: It is obvious that for a system that is referred to in a tourist context that it is important that all information can be registered in many languages and that all operations at least be available in English language.

- **Content enrichment**: WISETRIP will support the provision of alerting messages for personalised information. Messages that will be dispatched will include at least information with the timetable of routes (e.g. delays, cancellations etc.) as well as static information (e.g. rules and directives of embarkation). Moreover, it would be interesting to forward other messages, such as messages related to weather, points of tickets control, departure gates, offers of shops or scheduled events in the passengers waiting areas etc.

Business Role through Advanced Application & services

In order for WISETRIP to become an integrated information system capable towards exploitation several applications should be investigated and if needed developed. These include:

- **Specific interface for the subscription of travel agencies**: a special application addressed to travel agencies that might register the routes of their customers and provide them information via SMS. The application will forecast possibilities of mass customer registration for a route (particularly useful in the case of groups), connection with the booking system of the agency (for automatic import of customers in the information system at the time of ticket reservation), management of messages, so that the agent can cancel the mission of certain predetermined messages that are not considered worthwhile, but also dispatch other messages to the customers (e.g. offers).
etc. Though one might believe that such a service (by which we mean WISETRIP-like) might be poor in terms of business value (i.e. urban Journey Planners or national Journey Planners are viewed more favourably than those covering international routing), its role and value can be focused to take the role:

- of an International service for travellers and travel professionals. Subscription option with enhanced features could offer a revenue stream,
- of a reference point for Journey Planners, similar to a directory of Journey Planners across countries who can also ‘participate’ into a unified query engine

- **B2B XML interface for interconnection with other electronic means of information**: an interface giving to external electronic information systems (e.g. travelling web or voice portals, call centers, websites of mass transport organisations, local authorities etc.) access to the WISETRIP information. Communication among the external systems and WISETRIP will be established with protocols based on the model XML, while obviously there should be mechanisms that will check, depending on existing commercial agreements, the type and the amount of information that will be accessible from the external systems.

- **Advanced personalised information**: WISETRIP could include advanced services of personalised information, such as searching of a route with intermediary interval at specific stops, call back service in case of a change in the user selected route (instead of an SMS system it could call the user), call redirection services for further support of the user (e.g. in case a user needs to modify his route, the system could propose an alternative route and also bring him in contact with a travel agent for the purchase of ticket) etc.

- **Registration service and payment of subscription**: It is obvious that in the event of WISETRIP commercial exploitation a registration service should be developed allowing the user to determine his entry data (username and password) and form his profile by importing an email address and the number of his mobile telephone in which it will accept personalised messages of support from the system. An e-payment service should also be developed allowing the user to pay his subscription debiting his credit card. Obviously issues of safety of card, communication with banking system and other issues related with economic settlements over internet should be carefully taken into account.

**International Marketing & Financial Model**

WISETRIP as an international network of Journey planners when exploited should utilise methods of international and on-line marketing in order to become well known and reach acceptance from the travellers and the tourism market. Focusing into that market will reveal the need to seek synergies with on-line tour operators and travel portals.

Moreover, its international nature and its composition from many participating entities (journey planners) form a difficult environment for revenue definition and sharing policies. A set of solid and reasonable proposals related to revenue and funding assurance for WISETRIP could be proposed having in mind the various revenue models that Journey Planners are using today, mainly:

- Sponsored sites (public, public-private, private-only)
- Subscription based sites
- SMS revenue share
- Call centre service minutes value sharing

WISETRIP is an advertising engine for a specific Journey Planner, who in turn offers its content for a new revenue source through WISETRIP joint services. This generic formation should be detailed within a feasibility and exploitation study that will take place within the context of the project.
4.3.2. Business Considerations related to legal issues

The WISETRIP project aims to provide full coverage of traveller's information needs providing personalised information relevant to his/her booking and scheduled trip; consequently the collection and process of some personal data might be required. Moreover, it will be necessary for the system to know and exploit information relevant to traveller's position and movement, which is also strictly private data. Of course the above data will be collected only as part of the input for value added services provision (not previously collected data).

The WISETRIP project will offer to the traveller high level, value added services that will positively affect the quality of his/her life. But the provision of these services, as with all services provided over internet, hides several risks for the user. Personal data is recorded, the collection and process of which can lead to the violation of user's personal and private life. In particular, poll results show that the lack of privacy protection in electronic communications is one of the main discouraging reasons for potential users.

The provision of users’ right to privacy falls under regulations of European Community. EU Directives of the European Parliament and of the Council require Member States to protect the rights and freedoms of natural persons with regard to the processing of personal data, and in particular their right to privacy, in order to ensure the free flow of personal data in the Community. Special EU Directives and necessary amendment (i.e. 2002/58/EC and 2006/24/EC) concern the processing of personal data and the protection of privacy in the electronic communications sector and the retention of data generated or processed in connection with the provision of publicly available electronic communications services.

The WISETRIP Consortium should be very well informed about EC regulations as well as about the national regulations of all participants’ countries and during the design of the systems functions and services take them into consideration in order to identify key issues (and relevant solutions) to assure users’ privacy and abidance to the law. Such key issues refer among others to:

- confidentiality in communications and confidential private data (e.g. booking data): users’ acquiescence will be necessary for the collection and process of the needed private data and in any case the quantity of private data that will be collected will be limited to the minimum. Preferably data collection in WISETRIP project will be made using direct approaches like the completion of electronic forms.

- traffic data (e.g. billing transactions during booking, information messages interchange): processing of such data (allowed only with the users’ acquiescence) will take place only for the time period that billing or other value added services will be provided to the users. Access to traffic data will be strictly limited to predetermined members of the consortium.

- location data (e.g. user’s exact position and movement direction): The WISETRIP consortium will inform users about the exact type of location data that will be collected, the purpose and the duration that processing of data will take place as well as the possibility to forward such data in third parties in order to provide value added services. Of course, users’ acquiescence will again be necessary.

- unsolicited mails and messages (e.g. advertising messages with offers): with users’ acquiescence, the WISETRIP consortium will be able to forward to the users marketing messages clearly marked (so that users can ignore or delete them without reading).

4.3.3. Business Considerations related to other restrictions

The following restrictions mainly result from the business policy and the marketing principles followed by companies and organisations that will act as intermediate users of the system (ports, airports, companies activated in the area of transport and tourism etc.).
Companies that avoid publishing pricing information

There are transport companies (e.g. airlines, ferries etc.) which do not want pricing information to be available via multi-modal information systems such as Journey Planners since:

- Either discounts and offers are not presented

The final price of a ticket is related to several parameters, such as number of passengers, traveling class, dates and other data that might compose special discounts and offers. Consequently the transport company prefers to know in advance such information in order to form an indicative price offer for the traveler, not allowing him/her to be misled because of insufficient information.

- Or companies want to avoid comparisons

In a brochure or a site with several different transportation means, the impression of indicative prices might be unfair for a company especially when the quality of travel and services is significant different. Usually this difference is not possible to be presented in an information system and consequently companies refuse the publishing of their tickets pricing list.

Henceforth, the idea to include pricing information across routes and transport means within WISETRIP system is most probable to fail to achieve because of reluctance faced from the side of companies.

Constraints from the passengers information updated

The passengers’ notifications on modifications of scheduled routes in real-time depend on many factors:

- On the immediacy and promptness that the online system will be informed for the route modification by the transport company’s responsible directorate. When this happens the distribution system will be immediately informed and publish reliable route information

- On the cause of change/modification of a scheduled route

  o When it is a schedule change, then it simply requires the direct briefing of company’s system as mentioned above.

  o When it is a route cancellation or delay of departure because of bad weather conditions, the briefing cannot become beforehand since the conditions are unsteady, the means could eventually depart from moment to moment or from hour to hour, and the companies do not want to "risk" announcing final departure hours, unless they are sure and have decided. However, something may happen only a few minutes before the departure and with the passengers having passed the process of embarkation and control.

  o When the delay is a consequence of the arrival delay (it happens mainly in air transportation and in ferry routes with intermediate hops), then again the briefing depends on the accuracy of available real-time information about the exact location and arrival time. In the case of ferries the information is particularly important since the passenger wants and can delay proportionally his/her arrival in the port. However in air transport, the control process always takes place in the time interval before the scheduled departure, and consequently passenger information is not desirable, while in a lot of cases means of replacement is also feasible.

The above restrictions affect the validity and reliability of information that will be provided through a system such as WISETRIP. Because of that they should be seriously considered and effectively faced, particularly in the case of a commercial exploitation of project results, probably with collaborations with the involved intermediary users.

4.3.4. Considering Opportunities & Risks

The most important opportunity for WISETRIP exploitation arises from the evolution of mobile Internet services either over 3G or over wireless broadband technology (WiFi, WiMax ...).
Exploitation of content that WISETRIP will integrate with location awareness capabilities poses a great opportunity from technical but also from commercial opinion.

Moreover, the completion of information with the ability of booking in multi-modal transportation means is of extreme importance. The collaboration with the booking systems of all involved Journey Planners and transportation means does not constitute a simple process since it requires the technical interconnection of heterogeneous systems but also the commercial collaboration of transport organisations.

The most important risks are presented as:

- The non-access in the most important transportation means or countries will constitute a factor of non-completion of content and it will have as a result a system lacking the characteristic of information completeness and geographical coverage.
- The expected existence of competitive efforts (either from private initiative or from the public sector) that are based in mechanisms of public information (web sites), in-vehicle systems, voice systems of transport companies, ports etc. WISETRIP could strengthen its presence utilizing its possibility to provide personalised information and trying to approach the market of travel agencies.

4.4. Summary of Constraints and Limitations for WISETRIP

WISETRIP constitutes a passenger information and journey planning system covering the travellers needs for international, interurban (national, regional) and intra-urban journeys. The development of the system will be based on the integration of various existing journey planners and other external data sources. Thus, the development of WISETRIP system involves various categories of constraints emerging from:

i) the difficulties in integrating functionalities and technologies offered by different journey planners,

ii) national, European and international institutional framework regarding personal data privacy and protection,

iii) the business oriented limitations stemming from the internal policies of the companies managing the transport data or the journey planner.

Three major categories of constraints have been identified: i) technological, ii) institutional, and iii) business constraints. The objective of this subsection is to present an overview of the major constraints identified for each of the above categories. Table 6 presents an overview of the system constraints pertinent to the development of WISETRIP.

The technological constraints are basically attributed to the shortcomings that might arise from the integration of the various participating journey planners (e.g. different data representations). The legal and institutional constraints pertain to the issues arising from the personalized information services and their impacts on personal information privacy, and the data availability by transport operators in deregulated transport systems. Finally the business oriented constraints relate to the policies of the transport operators in providing travel and the marketing strategy for the international exposure and dissemination of the WISETRIP services.

<table>
<thead>
<tr>
<th>Constraint Category</th>
<th>ID</th>
<th>Constraint</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technological</td>
<td>TC1</td>
<td>Common/Similar Real time alerts</td>
<td>The participating journey planners should provide alerts about similar or common events affecting a journey.</td>
</tr>
<tr>
<td></td>
<td>TC2</td>
<td>Itinerary regular updates</td>
<td>Itinerary regular updates should be accommodated by the participating journey planners.</td>
</tr>
<tr>
<td></td>
<td>TC3</td>
<td>No dynamic traffic data is currently handled</td>
<td>No dynamic traffic data is currently handled by the participating journey planners</td>
</tr>
<tr>
<td></td>
<td>TC4</td>
<td>Similar itinerary sorting and filtering</td>
<td>The participating journey planners should enable sorting and filtering by a set of common criteria.</td>
</tr>
<tr>
<td></td>
<td>TC5</td>
<td>Data representation</td>
<td>Different journey planners involve different network or schedule</td>
</tr>
<tr>
<td>Constraint Category</td>
<td>ID</td>
<td>Constraint</td>
<td>Definition</td>
</tr>
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</tr>
<tr>
<td></td>
<td></td>
<td>variations</td>
<td>data representations</td>
</tr>
<tr>
<td></td>
<td>TC6</td>
<td>Compatibility of mobile phone networks</td>
<td>Mobile phones constitute an important communication channel endorsed in WISETRIP for disseminating personalized travel information. Compatibility of mobile phone networks assures that the traveller will be provided with travel information anywhere and anytime.</td>
</tr>
<tr>
<td></td>
<td>TC7</td>
<td>Communication with external systems</td>
<td>Communication with external data sources implies that a protocol of XML model should be used</td>
</tr>
<tr>
<td>Legal and Institutional</td>
<td>IC1</td>
<td>Personal data protection and privacy</td>
<td>Any information that relates to the travellers position, intention to travel, other personal information is protected by national and EC legislation.</td>
</tr>
<tr>
<td></td>
<td>IC2</td>
<td>Difficulty for co-operation between transport data providers, in deregulated environment.</td>
<td>This constraint is due to the competitiveness between transport organizations/operators that usually arises in deregulated transport systems. The arising competition hinders the companies of providing schedule or ticket prices information.</td>
</tr>
<tr>
<td></td>
<td>IC3</td>
<td>Property of data</td>
<td>If the journey planner manager participating in WISETRIP is not the owner of the data, then the consent of the data provider might be need in order to process or disseminate the data through WISETRIP</td>
</tr>
<tr>
<td>Business oriented</td>
<td>BC1</td>
<td>International Marketing</td>
<td>Since WISETRIP will support international journey planning decision, an international dissemination of its services should be envisaged (e.g. through synergies with on-line tour operators and travel portals)</td>
</tr>
<tr>
<td></td>
<td>BC2</td>
<td>Companies Pricing Policies</td>
<td>Transport operators are reluctant in providing ticket price information, since different prices apply for reservations including different number of passengers (e.g. special offers)</td>
</tr>
<tr>
<td></td>
<td>BC3</td>
<td>Lateness of announcing schedule changes and delays</td>
<td>In some cases that the departure or arrival delays are due to weather conditions, the companies are reluctant in announcing delays or cancellations early enough.</td>
</tr>
<tr>
<td></td>
<td>BC4</td>
<td>Responsibility of data provider for accuracy of delays and schedule changes</td>
<td>WISETRIP published or process any schedule updates provided by the data provider (external source of data). Thus, the accuracy and reliability of data depend on the policy of the corresponding organization in updating the relevant data.</td>
</tr>
</tbody>
</table>

Table 6. Overview of technological, institutional, and business oriented constraints relevant to the WISETRIP development.

The system constraints presented in Table 6 will be taken into account in designing WISETRIP. The actions needed for addressing each of the above constraints will be identified and presented in the document D2.2 referring to the design of WISETRIP.
5. WISETRIP potential functionalities

A set of potential functionalities has been identified on the basis of covering the journey planning and information needs. In particular, each of the journey planning and information needs (N1-N11) expresses a generic type of service not currently covered or only partially covered by the existing systems. This set of generic journey planning and information needs is further elaborated by identifying the potential services that cover one or more of the emerging needs. This set of functionalities has been identified by a set of experts with substantial knowledge in journey planning systems. Initially, a super set of functionalities that covered the WISETRIP user needs was identified. The initial set of functionalities was further rated by the experts in terms of importance. A filtering process was then applied on the entire set of functionalities, excluding those rated by the experts with very low importance score. In this context, the potential system functionalities presented in Table 7 emerged. Each service is associated with the relevant needs that it could potentially address.

<table>
<thead>
<tr>
<th>ID</th>
<th>Potential System functionalities</th>
<th>Relevant User Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>Profile creation</td>
<td>(N1) Creating and retrieving a personal profile anytime &amp; anywhere</td>
</tr>
<tr>
<td>S2</td>
<td>Journey related info storage/display/deletion (Itinerary, info alerts requested)</td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td>Access of personal profile from a PDA</td>
<td></td>
</tr>
<tr>
<td>S4</td>
<td>Access of personal profile from the Internet</td>
<td></td>
</tr>
<tr>
<td>S5</td>
<td>Access of personal profile from an Info-Kiosk</td>
<td></td>
</tr>
<tr>
<td>S6</td>
<td>Access of personal profile from a mobile phone</td>
<td></td>
</tr>
<tr>
<td>S7</td>
<td>International door-to-door Journey Planning</td>
<td>(N2) Detailed description of the part of the itinerary covering foreign countries with specialized information on how to transfer between modes</td>
</tr>
<tr>
<td>S8</td>
<td>Interurban Journey Planning</td>
<td>(N5) Replan the remaining itinerary from current intermediate stop to destination</td>
</tr>
<tr>
<td>S9</td>
<td>Urban Journey Planning</td>
<td>(N8) Reminder of the next transport service, departure time and boarding location (e.g. platform)</td>
</tr>
<tr>
<td>S10</td>
<td>Itinerary Display in tabular form</td>
<td></td>
</tr>
<tr>
<td>S11</td>
<td>Map-based itinerary display</td>
<td></td>
</tr>
<tr>
<td>S12</td>
<td>Diagram based itinerary display</td>
<td></td>
</tr>
<tr>
<td>S13</td>
<td>Ticket availability check</td>
<td>(N3) Access to on-line journey booking</td>
</tr>
<tr>
<td>S14</td>
<td>Online ticket booking</td>
<td></td>
</tr>
<tr>
<td>S15</td>
<td>Provision of web links to booking systems</td>
<td></td>
</tr>
<tr>
<td>S16</td>
<td>Alerting Messages</td>
<td>(N4) Alerts (by SMS or e-mail) regarding any disruption of the selected itinerary before the commencement of the journey</td>
</tr>
<tr>
<td>S17</td>
<td>Alerting by e-mail</td>
<td>(N6) Real time alerts about disruption of transport services affecting the trip</td>
</tr>
<tr>
<td>S18</td>
<td>Alerting through the Mobile Phone</td>
<td>(N7) Real time alerts about delays affecting the trip</td>
</tr>
<tr>
<td>S19</td>
<td>Alerting through the PDA</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>ID</th>
<th>Potential System functionalities</th>
<th>Relevant User Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(N7) Real time alerts about delays affecting the trip</td>
</tr>
<tr>
<td>S20</td>
<td>Re-planning through the Internet</td>
<td>(N5) Replan the remaining itinerary from current intermediate stop to destination</td>
</tr>
<tr>
<td>S21</td>
<td>Re-planning through Info-kiosk</td>
<td></td>
</tr>
<tr>
<td>S22</td>
<td>Re-planning through Mobile Phone (SMS)</td>
<td></td>
</tr>
<tr>
<td>S23</td>
<td>Re-planning through PDAs</td>
<td></td>
</tr>
<tr>
<td>S24</td>
<td>Travel Reminders through Mobile Phone</td>
<td>(N8) Reminder of the next transport service, departure time and boarding location</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(e.g. platform)</td>
</tr>
<tr>
<td>S25</td>
<td>Travel Reminders through PDAs</td>
<td></td>
</tr>
<tr>
<td>S26</td>
<td>Handling Commercial Info Request</td>
<td>(N9) Points for Tourist info</td>
</tr>
<tr>
<td>S27</td>
<td>Handling Travel related Info Request</td>
<td>(N10) Points for Car-hire</td>
</tr>
<tr>
<td>S28</td>
<td>Requesting info through the Info-kiosk</td>
<td>(N11) Taxi stand location</td>
</tr>
<tr>
<td>S29</td>
<td>Requesting info through Mobile Phone</td>
<td></td>
</tr>
<tr>
<td>S30</td>
<td>Requesting info through PDAs</td>
<td></td>
</tr>
</tbody>
</table>

**Table 7. Potential system functionalities/services that could be integrated in WISETRIP**
6. DATA COLLECTION AND ANALYSIS

6.1. **Organization of Data Collection Process**

The user needs analysis was based on the application of the Quality Function Deployment (QFD) method described in Chapter 2. Given the set of preliminary user needs and a set of potential system functionalities, the following data categories are needed in order to apply QFD:

   i) the weights of importance of the user-needs from the perspective of the end-users,
   ii) the degree of satisfaction of the end-users from the existing systems in covering each of the user needs,
   iii) the weight of importance assigned by experts (system developers) to covering each of the user needs,
   iv) the degree of linkage between the user needs with the proposed system functionalities.

The collection of the above categories of data has involved the development and administration of two questionnaires, one for the end-users, and one for developers of the proposed Journey Planner (JP). Both of these data collection instruments are described fully in Section 5.2. The questionnaire for end-users (referred to as the “Questionnaire on user needs”) was provided in template form to members of the consortium. A target of 50 questionnaires was set for completion at each of the project’s sites (Spain, UK, Finland, Italy, Greece, and China). Partners were responsible for the local administration of the data collection process. The data collection process for the end-users resulted in the completion of:

   i) 50 questionnaires from UK, ii) 53 from Italy, iii) 63 from Finland, iv) 50 from China, v) 50 from Spain, and vi) 50 from Greece.

On the other hand, the questionnaire for the developers (referred to as the “Questionnaire on system functionalities”) was provided in template form to members of the consortium who were responsible for organizing its completion by experts. Each organization identified experts having substantial knowledge on journey planning design and the WISETRIP objectives and target services. In addition to the five participating WISETRIP JPs, this information was also collected for Spain. A target of two to three experts per organization was set. Partners were required to return results using an excel file.

More information regarding the content of both questionnaires is provided in the section that follows.

6.2. **Data Collection Instruments**

As mentioned in the previous section, two questionnaires were developed (namely “Questionnaire on user needs” and “Questionnaire on system functionalities”) in order to collect the data needed for the user requirements identification. The former questionnaire aims to collect the end-users rating regarding the following issues:

- **Weight of importance of each user need.** This type of measurement involves the ratings provided by a set of end-users on a scale from 1-5 regarding the importance of each user need. The value 1 stands for “low importance”, 3 for “moderate importance”, 5 for “high importance”, while values 2 and 4 denote intermediate judgments.

- **Degree of satisfaction of end users from existing journey planners in covering each of the user needs.** A scale from 1 to 5 is also used for this type of measurement, where 1
stands for “low satisfaction”, 3 for “moderate satisfaction”, 5 for “high satisfaction”,
while values 2 and 4 denote intermediate judgments.

In this context, the Questionnaire on User Needs consists of three sections. In the first section
there are a set of questions referring to:

i) demographic information of the respondents (i.e., age, gender, education, occupation),

ii) personal information related to the frequency of performing urban and international
journeys through public transport,

iii) degree of acquaintance of the respondents with journey planning through the internet.

The analysis of the above type of information is needed in order to identify the profile of the
sample of end-users or develop special groups of respondents for performing the user needs
analysis. The second section of the questionnaire, aims to collect the above ratings associated
to the importance and satisfaction of the WISETRIP user needs. The identification of the user
needs has been achieved through a literature review of the existing passenger information
systems and the relevant systems developed in Research projects. This process has led to a
set of features (user needs) that should be covered by the proposed journey planner. Thus, a
set of questions is included each one asking the respondent to provide an importance and
satisfaction score (from 1 to 5) with regards to each user need. The third section of the
questionnaire aims to investigate the end-users willingness to pay for a journey planner with
the features implied by the user needs covered. This category of questions will be analysed for
the potential exploitation of WISETRIP.

The Questionnaire for the system functionalities (provided in Appendix I) has been developed
in order to facilitate the collection of the following ratings:

− The degree of linkage (on a scale from 1 to 5) of each user need with any relevant
system functionality. In other words, this rating indicates how important is each system
functionality in covering the corresponding user need. The scale for measuring this
feature is qualitative. Value 1 stands for “very low linkage”, 5 for “very strong linkage,”,
3 for “moderate linkage”, while 2 and 4 stand for intermediate judgments.

− The degree of importance for the WISETRIP developers in developing WISETRIP so as
to cover each of the user needs. This type of rating is provided on a 1-5 scale where “1”
stands for “low importance”, 3 for “moderate importance”, 5 for “high importance”,
while 2 and 4 for intermediate judgments.

Thus, the questionnaire consists of a set of questions each one referring to a user need and
asking the respondent to provide a score expressing the degree of linkage of the user
need with each relevant system functionality. In addition, the questionnaire includes a question asking from the respondent to provide an importance score
for each user need from the perspective of the system developer.

6.3. Data Analysis Method

The application of the QFD method for the user requirements analysis provides the following
measures:

i) the overall weight of importance for each user need from the perspective of end-
users,

ii) the overall weight of satisfaction of the end-users from the existing systems in
covering each of the user needs,

iii) the overall priority calculated for each of the potential system functionalities.

Measures (i) and (ii) indicate the user needs which are important while not fully covered from
the existing journey planners. Thus, the assessment of these two measures identifies the type
of services and functionalities that best fit to the user needs and expectations. Measure (iii) expresses the overall priorities for the system functionalities that emerge from the user needs analysis (through QFD). This measures is continuous and takes values in the range [0,5]. System functionalities with overall priority close to 0, i.e. in [0,1.5), are considered as low importance functionalities. Functionalities with weight close to 3, i.e. in [1.5, 3.5) are considered as moderate important, while functionalities with overall weights close to 5, i.e. in [3.5,5] are considered very important. In this context, the system functionalities are classified according to the corresponding overall weight two three major groups of functionalities: i) low importance, moderate importance, and high importance functionalities. The expected outcome of the data analysis process is to identify the above classification of functionalities. In addition, the functionalities that cover a user need with high importance and low satisfaction are also identified. The decision regarding the selection of the functionalities that should be integrated in WISETRIP will be made in the Design phase of the system, and it will be based on the above two supporting types of information.

The results of the above type of analysis for WISETRIP is presented in section 7 that follows.
7. RESULTS OF THE USER REQUIREMENTS ANALYSIS

The analysis of the data collected through the end-users survey across five European countries (UK, Spain, Italy, Finland, Greece) and China, are performed on the basis of the following analysis scenaria:

i) Per country: In this analysis scenario, the objective is to investigate the user requirements in each country represented in the WISETRIP.

ii) Overall Analysis, referring to the analysis of the entire set of data collected at any country

In what follows, there is a presentation of the results obtained in each of the above analysis scenarios.

7.1. Results per Country

7.1.1. User Requirements Results in UK

Based on the importance and satisfaction scores for the user needs in UK presented in Figure 5, it can be verified that the most significant users needs (i.e., those with high importance and low satisfaction scores) includes:

- Access to on-line ticket booking (N3),
- Detailed description of an itinerary especially for parts occurring in foreign countries (N2)
- Alerting before the commencement of the journey (N4)
- Moreover the needs for real time alerts while en-route (N6, N7),
- Replanning the itinerary (N5),
- Provision of travel reminders about the remaining part of the journey (N8).

All of the above have obtained a moderate importance score but low satisfaction score. In the context of user requirements analysis, it is concluded that functionalities covering the above needs would be probably appreciated by the end-users.

It should also be emphasized that although the need for personalized information (N1) has obtained a low score for satisfaction, the importance score is moderate to low. This finding might imply that the end-users are quite reluctant to personalized information services due to their perception that their personal information might not be well protected. Finally the needs for post-trip information provision (N9-N11) have obtained moderate scores in both importance and satisfaction.
Figure 5. Weights of importance and satisfaction calculated for the user needs based on the data collected in UK.

Based on the overall priorities identified for the potential system functionalities presented in Figure 6, the International and Interurban door-to-door Journey Planning (S7, S8), and the Real time alerts provision through mobile phones (S18) constitute the functionalities rated with high importance scores. Moderate importance scores were obtained for the alerting related functionalities through PDA or e-mails (S17, S19), the access to booking systems and ticket availability checks (S13-S15), the urban journey planning, (S9), the itinerary display on a map or in tabular form (S10, S11), and the personal profile functionalities accessed through the mobile phone or the internet (S1, S2, S4, S6). Finally, Low importance scores were obtained for the functionalities related to the personal profile through PDAs or Info-kiosks (S3, S5), itinerary diagram-based display (S12), replanning an itinerary before or after the commencement of a journey (S20-S22), Requesting travel or commercial information while en-route (S26-S30), and provision of travel reminders about specific events in a journey (S24-S25).
Figure 6. Overview of the QFD results regarding the user requirements in UK

Given the above analysis, the following findings emerge:

- Providing personalized journey related information through the PDA’s or information kiosks at the terminal stations is not highly appreciated by the end-users. Note that the relevant functionalities have received below average importance scores.

- Replanning a journey is not either highly appreciated by end-users. This finding might imply the lack of trust of end-users to a journey planner in securing the continuation of his/her journey while en-route taking into account the shortcomings of existing system in ticket booking and ticket availability checks.

- Requesting travel/commercial information en-route through mobile devices or information kiosk is not highly rated by end-users. This finding might imply that the end-users assess the support from the points of information at terminal as more reliable and accurate rather than the on-line support provided by a journey planner.

- Definitely the door-to-door international and interurban journey planning along with real time alerts about a journey constitute the most highly appreciated functionalities.

- Although urban journey planning functionality has concentrated a moderate importance score, it contributes substantially in covering the need for detailed description of mode transfers in foreign countries (N2) which is a user need with high importance (high importance score-low satisfaction). Thus, an urban journey planning functionality
developed in the above context might be taken into account in the design and functional specifications of WISETRIP.

- A similar finding as above (moderate importance functionalities, covering high importance user need) can be supported for the on-line access to ticket booking engines.
- End-users indicate a preference in reading an itinerary on a map or tabular based form rather than a diagram based form.
- Although the functionality of providing travel reminders for a specific journey while en-route have been assessed with a low importance score, they provide substantial contribution in covering the need for getting en-route reminders which is rated with moderate importance but low satisfaction. Substantial interest may arise in integrating this type of functionality as well.
7.1.2. User Requirements Results in Italy

The importance and satisfaction scores of the user needs presented in Figure 7 imply that the needs for:

- personalized information (N1),
- detailed description of the itinerary with emphasis on the transit legs realized in a foreign country (N2),
- access to on-line booking services (N3)
- alerts before commencement of journey (N4)

have obtained high or at least moderate importance score but low satisfaction score.

In addition the needs referring to:

- replanning a journey (N5),
- real-time alerts while en-route (N6, N7),
- reminders about specific planned events in a journey (N8),
- post trip information for point of car-hire and tourist-info

have been rated with high importance score but moderate satisfaction.

Thus, identifying and integrating in WISETRIP functionalities covering this set of needs is of high importance for the design of the system. On the other hand the need for post-trip information regarding taxi stand locations has been given high importance score with high satisfaction score, thus leaving no potential for offering through WISETRIP a substantially improved relevant service.

![Figure 7. Weights of importance and satisfaction calculated for the user needs based on the data collected in Italy.](image-url)
The importance scores of the potential system functionalities presented in Figure 8 indicate that the International/Interurban door to door journey planning (S7, S8) and the real time alerting functionalities on the mobile phone (S16, S18) constitute potential functionalities of high importance. The functionalities of moderate importance include the real time alerting through PDAs or e-mail (S17, S19), on-line ticket booking (S13-S15), handling commercial/travel info requests on the mobile phone (S29), Itinerary display in a map or tabular based form, access to personal profile through the internet and the mobile phone (S1, S2, S4, S6), and urban journey planning (S9).

On the other hand the functionalities related to personalized info through the PDAs or info-kiosks (S3, S5), the itinerary display on a diagram based form, replanning a journey and providing travel reminders (S20-S25), and addressing travel/commercial information requests from a traveller while being en-route, were assessed with low importance score.

![Figure 8. Overview of the QFD results regarding the user requirements in Italy](image)

Based on the above analysis results for the Italian site, the following findings can be supported:

- Replanning a journey and handling travel requests through PDAs and info-kiosks by a traveller while being en-route is not highly favoured by the end-users in Italy. However, it should be pointed out that capabilities for replanning a journey constitutes an important
user need (high importance-moderate satisfaction). Therefore, although low importance score has been calculated for journey replanning, such a functionality should not be neglected at all during the design phase of the system.

- Door-to-door international and interurban journey planning along with real-time alerts about a journey (through the mobile phone) constitute the most highly rated functionalities. Moreover, real-time alerts through PDAs or e-mails were rated as moderate important.

- Although travel/commercial requests by PDAs or info kiosks are not favoured by end users, the corresponding service through a mobile phone is rated as moderate important. This finding should be taken into account on specifying the relevant service of WISETRIP.

- Concerning the display of an itinerary, end users seem to prefer the map or tabular based form from the diagram based one.

- Access to the personal profile related functionalities through the mobile phone and the internet and access to on-line ticket booking services on the internet are also rated as moderate important by Italian end users.
7.1.3. User Requirements Results in Spain

Figure 9 presents the importance and satisfaction scores of the user needs based on the data collected at the Spanish site. Based on these scores, the needs for:

- personalized information (N1),
- detailed description on the part of the itinerary realized in a foreign country (N2),
- access to on-line booking services (N3)
- alerts before commencement of journey (N4)

have obtained high or at least moderate importance score but low satisfaction score. Particular interest was also addressed on the user needs regarding:

- the real time alerts for disruption of a planned journey (N6, N7)
- the provision of post trip information regarding the points for tourist-info (N9)

for which high importance scores and moderate satisfaction scores was calculated. User needs regarding:

- replanning a journey (N5),
- point for car-hire and taxi stand location (N10, N11)

were rated with moderate importance score and moderate satisfaction score, thus concentrating limited interest in terms of identifying relevant functionalities for WISETRIP.

![Figure 9. Weights of importance and satisfaction calculated for the user needs based on the data collected in Spain.](image)

Figure 10 presents the importance scores calculated for the potential system functionalities based on the application of QFD model at the Spanish site. Based on these importance scores
it is concluded that the International/Interurban door to door journey planning (S7, S8) and the real time alerting through the mobile phone (S16, S18) constitute potential WISETRIP functionalities of high importance. On the other hand, the functionalities referring to requesting travel/commercial information by all communication channels (S26-S30), travel reminders through PDAs and mobile phones (S24, S25), journey replanning (S20-S23), access to personalized information through PDAs or info-kiosks (S3, S5), and diagram based itinerary display (S12), was rated with low importance scores. Finally, the functionalities referring to urban journey planning (S9), Map or tabular based itinerary display (S10, S11), on-line ticket booking (S13-S15), alerting through the Internet (by e-mail) or PDAs, and accessing personal information the Internet or the mobile phone, was rated with moderate importance scores.

![Figure 10. Overview of the QFD results regarding the user requirements in Spain](image)

Based on the above analysis, the following findings can be stated:

- Door-to-door international and interurban journey planning and real time alerting for a journey through the mobile phone constitute the most highly rated functionalities. Alerting with PDAs or through the internet (e-mail) was only rated with moderate importance scores. However, given that alerting for a journey through the internet (by e-mail) contributes substantially in covering the need for alerting before the commencement of a journey (a user need with high importance and low satisfaction), the relevant functionality
customized for notifying the traveller at the pre-trip phase of his/her journey should be taken into account for the design of the system.

- Map or tabular based itinerary display is preferred than the diagram based display.
- Although urban journey planning was given a moderate importance score, its contribution in covering the need for detailed itinerary description (user need of high importance with low satisfaction) implies that urban journey planning for transferring between modes constitutes a functionality that should be taken into account in design and functional specifications of WISETRIP.
- A similar (as the previous) statement can be made for the online ticket booking functionality since the corresponding user need for on-line ticket booking was rated with high importance and low satisfaction scores.
- In general it can be argued that the provision of information through PDAs or Information kiosks and journey replanning (either before or after journey commencement) was not highly appreciated by end users.
- Handling information request through the mobile phone have a higher importance score than the corresponding functionalities through PDAs or info kiosks.
7.1.4. User Requirements Results in Finland

The assessment of the user needs in the Finnish site resulted to the relevant importance and satisfaction scores presented in Figure 11. Based on these scores, the user needs referring to:

- the detailed itinerary description with special emphasis on the part of the itinerary covering a foreign country (N2),
- access to on-line ticket booking (N3),
- alerting a traveller before commencing his/her journey (N4)

were rated with high importance and low satisfaction scores. The user needs referring to:

- real time alerting of travellers (N6, N7),
- provision of travel reminders (N8),
- replanning journeys (N5)

received high importance and moderate satisfaction scores. Thus, from the perspective of WISETRIP development, covering the above needs should be one of the goals of the system design process. The remaining user needs, referring to the Access to personal information (N1) and the provision of post-trip information (N9-N11) have received moderate importance and moderate to low satisfaction scores respectively.

Figure 11 presents the overall weights calculated for the potential functionalities of WISETRIP. International and interurban door to door journey planning (S7, S8) along with the alerting of the traveller regarding a journey on his/her mobile phone (S16, S18) constitute functionalities with high importance scores. On the other hand the functionalities of low importance score
include handling the info request set the traveller while en-route (S26, S30), the provision of travel reminders about specific events of a journey (S24, S25), journey replanning (S20-S23), the diagram based itinerary display (S12) and the access to personalized information on info-kiosks or PDAs (S3, S5). On line ticket booking functionalities (S13-S15) and alerting the traveller through the internet (e-mail) before the commencement of his/her journey were rated with moderate importance scores. Other functionalities with lower importance scores (but still characterized as moderate important) include the alerting through PDAs (S19), the map or tabular based itinerary display (S10, S11), urban journey planning (S9), and access to personalized information through the mobile phone and the internet (S1, S2, S4, S6).

Based on the above analysis, the following conclusions can be drawn:

- International and Interurban door to door journey planning and journey real time alerting on the mobile phone constitute the most functionalities considered as the most important from the perspective of designing WISETRIP. Although the importance score of the functionalities regarding the management of personal profile in not rated as high as the above functionalities, their implementation constitutes a prerequisite for providing alerting services.
The access to personal information through the internet and the mobile phone was preferred rather than the info kiosks and the PDAs.

Although the functionalities of on-line ticket booking have obtained moderate importance scores, they contributed substantially in covering the relevant highly rated user need (high importance and low satisfaction scores) for access to on line ticket booking.

Urban journey planning has obtained moderate importance score. However, its contribution in covering the need for detailed itinerary description (user need of high importance with low satisfaction) implies that urban journey planning for transferring between modes constitutes a functionality that should be taken into account in design and functional specifications of WISETRIP.

Handling information requests (travel or commercial) through the mobile phone has a higher importance score than the corresponding functionalities through other communication channels.

Journey replanning through the internet or the mobile phone have a higher importance score than journey replanning through PDAs or info kiosks.

Sending travel reminders on the mobile phone has a higher importance score than the sending travel reminders on PDAs.
7.1.5. User Requirements Results in China

The prioritization of user needs in China is based on the importance and satisfaction scores presented in Figure 13. It is evident that all user needs obtained a high importance score, apart from the one referring to the management of the personal profile which received a moderate importance score. On the other hand, the corresponding satisfaction scores were at the lowest level, since it seemed that the vast majority of the respondents had no actual experience with journey planners. In this context, covering any of the WISETRIP user needs is important from the perspective of the Chinese respondents.

Figure 13. Weights of importance and satisfaction calculated for the user needs based on the data collected in China.

Figure 14 presents the importance scores for the potential system functionalities calculated based on the application of the QFD model. Based on these scores, international and interurban door to door journey planning (S7, S8) along with real time alerting on the mobile phone (S16, S18) obtained the highest importance scores. On the other hand, the functionalities with low importance scores include the management and access to personal profile (S1-S6), the urban journey planning (S9), the itinerary display (S10-S12), the ticket availability check (S13), the journey replanning (S20-S23), and the provision of travel reminders (S24, S25). Handling travel related information requests received through the mobile phone (S26, S27, S29) and alerting through the PDAs (S19) constitute other significant functionalities rated with moderate importance scores. Additional system functionalities of moderate importance (rated however with lower scores as compared to the above functionalities) include handling info (travel and commercial) through the PDAs and info kiosks (S28, S30), alerting through e-mail (S17), and ticket booking (S14, S15).
Based on the above analysis the following remarks can be drawn:

- **International and Interurban door to door journey planning and journey real time alerting on the mobile phone** were considered as the most important functionalities from the perspective of designing WISETRIP. Although the importance score of the functionalities regarding the management of personal profile was not rated as high as the above functionalities, their implementation constitutes a prerequisite for providing alerting services.

- **Map-based or tabular based itinerary display** was preferred rather than the diagram based display.

- **Handling info-requests through the mobile phone** constitutes an important functionality for the Chinese respondents. Handling travel related information request is preferred to commercial information requests.

- **Replanning a journey through the mobile phone** has a higher importance score than journey replanning through the internet, info kiosks or PDAs.

- **Access to the personal profile through the internet** has higher importance score than having relevant access through PDAs, mobile phones, or info-kiosks.
7.1.6. User Requirements Results in Greece

This section presents the results of the user needs analysis for the data collected in Greece. Figure 15 presents the importance and satisfaction scores calculated for the user needs. Based on these results, the user needs:

- (N2) referring to the detailed description of the itinerary,
- (N3) regarding access to journey booking,
- (N4) about pre-trip alerting, (N5) about en-route journey replanning,
- (N6) and (N7) expressing the need for real time alerts,

were rated with high importance and low satisfaction scores. The need (N1) referring to creating and retrieving personal profile was rated with moderate importance and low satisfaction scores, while the needs (N9-N11) regarding the provision of post-trip information were rated with moderate importance and satisfaction scores.

![Figure 15. Weights of importance and satisfaction calculated for the user needs based on the data collected in Greece.](image)

Figure 16 presents the overall weights calculated for the potential system functionalities. Based on these weights, the functionalities related to international and interurban door to door journey planning (S7-S8) and en-route alerting on the mobile phone (S16, S18) obtained a high importance score. On the other hand, the functionalities related to handling information requests (S26-S30), journey replanning (S20-S23), the provision of travel reminders (S24-S25), and the access and management of personal profile (S1-S3, S5, S6) obtained a low importance score. The functionalities related to alerting through the PDA or the Internet (S17, S19), the provision to ticket booking services and on-line ticket booking (S14, S15) obtained a moderate importance score. Moreover, moderate score (but lower than the above) was also
calculated for the functionalities related to urban journey planning (S9), access to the personal profile through the internet (S4), and ticket availability check (S13).

**Figure 16. Overview of the QFD results regarding the user requirements in Greece**

Based on the above analysis the following findings can be concluded:

- International and Interurban door to door journey planning and journey real time alerting on the mobile phone constitute the most important functionalities from the perspective of designing.

- Although replanning functionalities were not rated with high importance score, the associated user need (N5) they aim to cover, belongs to the “high importance-low satisfaction” category of user needs. Therefore, the replanning functionalities should not be disregarded from integrating the WISETRIP.

- The functionalities related to handling information request obtained a lowest importance scores.

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7.2. **Overall Results**

The objective of this section is to present the user requirements results that emerged from the analysis of the data collected at all WISETRIP sites (i.e., UK, Italy, Spain, Finland, Greece, and China). **Figure 17** presents the importance and satisfaction scores calculated for the WISETRIP user needs. Based on these scores, the needs referring to:

- the detailed description of the parts of the itinerary covering foreign countries (N2),
- the access to on-line journey booking (N3) and
- the alerting before the commencement of the journey

were rated with high importance and low satisfaction scores. Thus covering each of these user needs by providing relevant improved functionalities should constitute a major goal for the design of WISETRIP. Moreover, the needs for:

- real time alerts (en-route) (N7, N7),
- travel reminders (N8) and information for the points of tourist information inside terminals (N9),

were rated with high importance and moderate satisfaction scores. This result implies that covering the above needs should also be taken into account during the design of the system. The remaining user needs were rated either with moderate importance and moderate satisfaction scores (i.e., Points for car hire (N10), taxi stand locations (N11), Replanning (N5)) or with moderate importance and low satisfaction scores (i.e. Personal profile creation management (N1))

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**Figure 17.** Weights of importance and satisfaction calculated for the user needs based on the entire set of data collected at all sites.
Figure 18 presents the overall priorities calculated for the potential system functionalities through the application of the QFD model. The International and Interurban door-to-door Journey Planning (S7, S8), and the Real time alerts provision on the mobile phone (S18) constitute the functionalities rated with the highest importance scores. Moderate importance scores were obtained for the alerting related functionalities through the internet (e-mails) (S20) and the on-line ticket booking (S13-S15). Moreover, other functionalities of moderate importance scores (but lower than the above stated) include the urban journey planning, (S9), the itinerary display on a map or in tabular form (S10, S11), the personal profile functionalities accessed through the internet (S1, S2, S4), and handling information requests through the mobile phone. Finally, low importance scores were obtained for the functionalities related to the personal profile through PDAs or Info-kiosks (S3, S5), the diagram-based itinerary display (S12), journey replanning (S20-S22), requesting travel or commercial information while en-route (S26-S30), and provision of travel reminders about specific events in a journey (S24-S25).
Based on the above analysis, the following findings have been identified:

- International and Interurban door to door journey planning and real time alerting on the mobile phone constitute the functionalities considered as the most important from the perspective of designing WISETRIP. Although the importance score of the functionalities regarding the management of personal profile is not rated as high as the above
functionalities, their implementation constitutes a prerequisite for providing alerting services.

- Urban journey planning has obtained moderate importance score. However, its contribution in covering the need for detailed itinerary description (user need of high importance with low satisfaction) implies that urban journey planning for transferring between modes constitutes a functionality that should be taken into account in design and functional specifications of WISETRIP.
- The access to personal information through the internet and the mobile phone is preferred than to the info kiosks and the PDAs.
- Although the functionalities of on-line ticket booking have obtained moderate importance scores, they contribute substantially in covering the relevant highly rated user need (high importance and low satisfaction scores) for access to on line ticket booking.
- Map or tabular based itinerary display are preferred to the diagram based display.
- Journey replanning through the mobile phone or the internet has obtained a higher importance score than replaning through PDAs or info kiosks.
- Having access to the personal profile through the internet has obtained a higher importance score than the corresponding functionality performed through the info kiosks, the mobile phone or the PDAs.
- Servicing info request through the mobile phone has obtained a higher importance score than the similar functionality provided through PDAs and info kiosks.
8. CONCLUDING REMARKS AND FUTURE STEPS

A major task in designing WISETRIP involves the identification of the services and functionalities that should be incorporated in the proposed system. The objective of this report is to determine and assess a set of potential system functionalities for WISETRIP on the basis of covering the WISETRIP user needs while complying with the technological, institutional, and business oriented constraints. A methodological framework was developed and implemented for identifying and analysing the user needs in order to determine and prioritize the associated system functionalities. The user needs analysis was based on the application of the Quality Function Deployment (QFD). The application of QFD involved the collection of the following categories of data:

i) weights of importance for the user needs,
ii) weights assigned to the user needs, expressing the degree of users satisfaction regarding the way they are addressed by existing systems,
iii) the degree of linkage of each user need with any relevant system functionality,
iv) the weight of importance given by the system developers to each of the user needs.

The collection of the data needed from the end-users have been performed to five European countries (UK, Spain, Italy, Finland, Greece) and China. Moreover, eleven experts coming from the organizations participating in WISETRIP development have provided the developers’ data needed for the analysis.

The application of the QFD method provided the following types of measures: i) the overall weight of importance for each user need from the perspective of end-users, ii) the overall weight of satisfaction of the end-users from the existing systems in covering each of the user needs, and iii) the overall priority calculated for each of the potential system functionalities. The above measures were calculated for the entire set of data collected at each site, and for each country separately. Based on the results of the data analysis, the following concluding remarks emerge:

- The results determined for the countries participating in the end-users survey converge to the results obtained from the analysis of the overall data set.
- According to the results from the overall set of data (and the data for each country separately) international and interurban door to door journey planning, and real time alerts through the mobile phone constitute the potential system functionalities that have obtained the highest rates in terms of importance.
- In general, the dissemination/distribution of information through mobile phones has been found more important than PDAs and information kiosks.

The outcome of this process includes a list of potential system functionalities rated at least with a moderate importance score. Table 8 presents the above set of system functionalities, grouped in terms of the score of importance that have obtained (i.e. moderate, high). Each functionality is also associated with the relevant technological, institutional, or business oriented constraints which might arise for their implementation.
<table>
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<th>Level of Importance</th>
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</tr>
<tr>
<td>Diagram based itinerary display</td>
<td>TC5 Data representation variations</td>
<td></td>
</tr>
<tr>
<td>Handling Travel related Info Request</td>
<td>TC5 Data representation variations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TC7 Communication with external systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IC2 Difficulty for cooperation between transport data providers</td>
<td></td>
</tr>
<tr>
<td>Access of personal profile from a PDA</td>
<td>TC6 Compatibility of mobile phone networks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IC1 Personal data protection and privacy</td>
<td></td>
</tr>
</tbody>
</table>

Table 8. Potential system functionalities grouped by level of importance and associated technological (TC), institutional (IC, and Business (BC) constraints.

The objective of the list of functionalities presented in Table 8 is to facilitate the determination of the specific functions and services that will be incorporated in WISETRIP. This type of problem will be addressed in Task 2.3 “Architecture Design and Data Framework” and Task 2.4 “Architecture Refinement” of WISETRIP project.
9. REFERENCES


IM@GINE-IT (2004) Use Cases and user / vehicle profile requirements. Deliverable D1.1. IM@GINE-IT Consortium, IST-508008.


10. Appendix I: WISETRIP Questionnaire on User Needs
PART A: Personal Information

Please complete the following list of personal information.

A1. Age
   Under 24
   25-34
   35-44
   45-54
   55-69
   70+

A2. Gender
   Male
   Female

A3. Education
   Elementary
   Secondary
   University
   Postgraduate

A4. What is/was your occupation? 

______________________________________________________________

A5. Please complete your name and e-mail.

First Name: 
Last Name: 
e-mail:

A6. How often do you travel abroad?

Never
Rarely (1-2 times a year)
Often (3-5 times a year)
Frequently (6-11 times a year)
Very Frequently (more than 12 times a year)
A7. How often do you make interurban journeys by public transport (e.g., coaches, railway, ferries, airlines)?

Never
Rarely (1-2 times a year)
Often (3-6 times a year)
Frequently (6-12 times a year)
Very Frequently (more than 12 times a year)

A8. Which of the following ways for planning multimodal journeys have you used? (Please tick as appropriate)

Yes  No

Internet
Travel Agency
Other

If other please specify:

PART B: Information for Travelers

B1. Please identify how important the following categories of information are for planning a international door-to-door journey by a journey planner. (Circle your choice)

<table>
<thead>
<tr>
<th>Importance Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

Creating and retrieving a personal profile anytime & anywhere
Detailed description of the part of the itinerary covering foreign countries with specialized information on how to transfer between modes
Access to on-line journey booking
Alerts (by SMS or e-mail) regarding any disruption of the selected itinerary before the commencement of the journey

Importance scores 1: unimportant, 2: barely important, 3: moderate, 4: important, 5: very important.

B2. Have you ever used a Journey Planner for planning an interurban journey? Yes† No‡

If yes, which?
B3. Please indicate on the left scoreboard how important you consider for international travelers to receive the en-route information listed below.
On the right scoreboard please indicate if this type of information is currently available in any way, and specify how satisfied you are from receiving this type of information.

<table>
<thead>
<tr>
<th>Importance Scores</th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
<th>Satisfaction Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replan the remaining itinerary from current intermediate stop to destination</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Real time alerts about disruption of transport services affecting the trip</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Real time alerts about delays affecting the trip</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Reminder of the next transport service, departure time and boarding location (e.g., platform)</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

Importance scores 1: unimportant, 2: barely important, 3: moderate, 4: important, 5: very important.

B4. Please indicate on the left scoreboard ("Importance") how important you consider for travelers to receive the information listed below while having arrived at the terminal station of his/her destination.
On the right scoreboard please indicate if this type of information is currently available in any way, and indicate how satisfied you are from receiving this type of information.

<table>
<thead>
<tr>
<th>Importance Scores</th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
<th>Satisfaction Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Points for Tourist info</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Points for Car-hire</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Taxi stand location</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

Importance scores 1: unimportant, 2: barely important, 3: moderate, 4: important, 5: very important.

PART C: Willingness to pay

Please indicate the highest rate you are willing to pay for the use of each of the following services?

Journey Planning (per use) Real Time Alerting (complete package of messages per journey)
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>€ 0.15</td>
<td>€ 0.50</td>
</tr>
<tr>
<td>€ 0.25</td>
<td>€ 1</td>
</tr>
<tr>
<td>€ 0.50</td>
<td>€ 1.50</td>
</tr>
<tr>
<td>€ 0.75</td>
<td>€ 2</td>
</tr>
<tr>
<td>€ 1</td>
<td>€ 2.5</td>
</tr>
<tr>
<td>€ 1.5</td>
<td>€ 3</td>
</tr>
</tbody>
</table>

Other (please specify): Other (please specify):

THANK YOU FOR YOUR CO-OPERATION
11. Appendix II: WISETRIP Questionnaire on System Functionalities
WISETRIP
QUESTIONNAIRE ON SYSTEM FUNCTIONALITIES

1. Please complete the following personal information.

   First Name:
   Last Name:
   Organization
   e-mail:

   What is your position in your organization ?.

2. For each of the following tables, please indicate what is the degree of linkage of the potential WISETRIP functionalities on the left with the corresponding user need on the right concerning the categories of information services needed for pre-trip planning a international door-to-door journey (Circle your choice).

   Table A

<table>
<thead>
<tr>
<th>FUNCTIONALITIES</th>
<th>Creating and retrieving a personal profile anytime &amp; anywhere</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Profile creation</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>2. Journey related info storage/display/ deletion</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>(Itinerary, info alerts requested)</td>
<td></td>
</tr>
<tr>
<td>3. Access of personal profile from a PDA</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>4. Access of personal profile from the Internet</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>5. Access of personal profile from an Info-Kiosk</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>6. Access of personal profile from a mobile phone</td>
<td>1  2  3  4  5</td>
</tr>
</tbody>
</table>

   scores 1: very low, 2: low, 3: moderate, 4: high, 5: very high.

   Table B

<table>
<thead>
<tr>
<th>FUNCTIONALITIES</th>
<th>Detailed description of the part of the itinerary covering foreign countries with specialized information on how to transfer between modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. International door-to-door Journey Planning</td>
<td>1  2  3  4  5</td>
</tr>
</tbody>
</table>
2. Interurban Journey Planning | 1 2 3 4 5
3. Urban Journey Planning | 1 2 3 4 5
4. Itinerary Display in tabular form | 1 2 3 4 5
5. Map-based itinerary display | 1 2 3 4 5
6. Diagram based itinerary display | 1 2 3 4 5

scores: 1: very low, 2: low, 3: moderate, 4: high, 5: very high.

Table C
FUNCTIONALITIES
1. Ticket availability check | Access to on-line journey booking
2. Online ticket booking
3. Provision of web links to booking systems

scores: 1: very low, 2: low, 3: moderate, 4: high, 5: very high.

Table D
FUNCTIONALITIES
1. Alerting Messages
2. Alerting by e-mail
3. Alerting through the Mobile Phone
4. Alerting through the PDA

alerts regarding any disruption of the selected itinerary before the commencement of the journey

scores: 1: very low, 2: low, 3: moderate, 4: high, 5: very high.

3. For each of the following tables, please indicate what is the degree of linkage of the potential WISETRIP functionalities on the left with the corresponding user need on the right concerning the categories of information needed during the en-route phase of an international door-to-door journey (Circle your choice).

Table A
FUNCTIONALITIES
1. International door-to-door Journey Planning
2. Interurban Journey Planning

replan the remaining itinerary from current intermediate stop to destination in case of disruption of journey

scores: 1: very low, 2: low, 3: moderate, 4: high, 5: very high.
3. Replanning through the Internet & 1 & 2 & 3 & 4 & 5 \\
4. Replanning through Info-kiosk & 1 & 2 & 3 & 4 & 5 \\
5. Replanning through Mobile Phone (SMS) & 1 & 2 & 3 & 4 & 5 \\
6. Replanning through PDAs & 1 & 2 & 3 & 4 & 5 \\
scores 1: very low, 2: low, 3: moderate, 4: high, 5: very high.

<table>
<thead>
<tr>
<th>Table B</th>
<th>FUNCTIONALITIES</th>
<th>Real time alerts about disruption of transport services affecting the trip</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Alerting Messages</td>
<td>1 &amp; 2 &amp; 3 &amp; 4 &amp; 5</td>
<td></td>
</tr>
<tr>
<td>2. Alerts through Mobile Phone (SMS)</td>
<td>1 &amp; 2 &amp; 3 &amp; 4 &amp; 5</td>
<td></td>
</tr>
<tr>
<td>3. Alerts through PDAs</td>
<td>1 &amp; 2 &amp; 3 &amp; 4 &amp; 5</td>
<td></td>
</tr>
</tbody>
</table>

scores 1: very low, 2: low, 3: moderate, 4: high, 5: very high.

<table>
<thead>
<tr>
<th>Table C</th>
<th>FUNCTIONALITIES</th>
<th>Real time alerts about delays affecting the trip</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Alerting Messages</td>
<td>1 &amp; 2 &amp; 3 &amp; 4 &amp; 5</td>
<td></td>
</tr>
<tr>
<td>2. Alerts through Mobile Phone (SMS)</td>
<td>1 &amp; 2 &amp; 3 &amp; 4 &amp; 5</td>
<td></td>
</tr>
<tr>
<td>3. Alerts through PDAs</td>
<td>1 &amp; 2 &amp; 3 &amp; 4 &amp; 5</td>
<td></td>
</tr>
</tbody>
</table>

scores 1: very low, 2: low, 3: moderate, 4: high, 5: very high.

<table>
<thead>
<tr>
<th>Table D</th>
<th>FUNCTIONALITIES</th>
<th>Reminder of the next transport service, departure time and boarding location (e.g. platform)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. International door-to-door Journey Planning</td>
<td>1 &amp; 2 &amp; 3 &amp; 4 &amp; 5</td>
<td></td>
</tr>
<tr>
<td>2. Interurban Journey Planning</td>
<td>1 &amp; 2 &amp; 3 &amp; 4 &amp; 5</td>
<td></td>
</tr>
<tr>
<td>3. Travel Reminders through Mobile Phone</td>
<td>1 &amp; 2 &amp; 3 &amp; 4 &amp; 5</td>
<td></td>
</tr>
<tr>
<td>4. Travel Reminders through PDAs</td>
<td>1 &amp; 2 &amp; 3 &amp; 4 &amp; 5</td>
<td></td>
</tr>
</tbody>
</table>

scores 1: very low, 2: low, 3: moderate, 4: high, 5: very high.
4. For each of the following tables, please indicate what is the degree of linkage of the potential WISETRIP functionalities on the left with the corresponding user need on the right concerning the categories of post-trip information needed for an international door-to-door journey (Circle your choice).

**Table A**

<table>
<thead>
<tr>
<th>FUNCTIONALITIES</th>
<th>Points for Tourist info</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Handling Commercial Info Request</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2. Handling Travel related Info Request</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3. Requesting info through the Info-kiosk</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4. Requesting info through Mobile Phone</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5. Requesting info through PDAs</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>


**Table B**

<table>
<thead>
<tr>
<th>FUNCTIONALITIES</th>
<th>Points for Car-hire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Handling Commercial Info Request</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2. Handling Travel related Info Request</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3. Requesting info through the Info-kiosk</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4. Requesting info through Mobile Phone</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5. Requesting info through PDAs</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

5. Please indicate how important is it for WISETRIP to cover each of the user needs included in the following list (Circle your choice).

<table>
<thead>
<tr>
<th>Phase of the Trip</th>
<th>FUNCTIONALITIES</th>
<th>IMPORTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-trip</td>
<td>1. Creating and retrieving a personal profile anytime &amp; anywhere</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>2. Detailed description of the part of the itinerary covering foreign countries with specialized information on how to transfer between modes</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>3. Access to on-line journey booking</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>4. Alerts (by SMS or e-mail) regarding any disruption of the selected itinerary before the commencement of the journey</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>En-route</td>
<td>5. Replan the remaining itinerary from current intermediate stop to destination</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>6. Real time alerts about disruption of transport services affecting the trip</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>7. Real time alerts about delays affecting the trip</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>8. Reminder of the next transport service, departure time and boarding location (e.g. platform)</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Post-trip</td>
<td>9. Points for Tourist info</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>10. Points for Car-hire</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>11. Taxi stand location</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

Importance scores: 1: unimportant, 2: barely important, 3: moderate, 4: important, 5: very important.

THANK YOU FOR YOUR CO-OPERATION
12. Appendix III: D2.1a Integration of the Results from Relevant EU Projects

Appendix III includes Deliverable D2.1a titled “Integration of the Results from Relevant EU Projects”. It presents the results of the work performed in Task 2.2 of WISETRIP project. Although D2.1a is included as an appendix to D2.1, it is a stand alone report. In addition to the main document, it includes five separate annexes (I-IV).
D2.1a: Integration of the Results from Relevant EU Projects

Due date of Deliverable: Month 4
Preparation date of Deliverable: 31/07/2008
Lead beneficiary: UNIABDN
Dissemination level: Public
Status: Final

Project Name: Wide Scale network of E-systems for Multimodal Journey Planning and Delivery of Trip Intelligent Personalised data
Acronym: WISETRIP
Start date of project: 01/02/2008
Duration: 30 Months
Project no.: 213233
## Document Properties

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<td>Integration of the Results from Relevant EU Projects</td>
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<tr>
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<td>AUEB-RC/TRANSLOG</td>
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<td><strong>Editor(s)</strong></td>
<td>UNIABDN</td>
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<td>Requirements Analysis &amp; Architecture Design</td>
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<tr>
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<td>Report</td>
</tr>
<tr>
<td><strong>Preparation Date</strong></td>
<td>31/07/2008</td>
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<tr>
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</table>
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Version 1.0 (final): 31/07/2008 |
| **Contributors**    | AUEB-RC/TRANSLOG        
Forthnet   
ATAF       
ANGUS      
ETRA       
DESTIA     |
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1. INTRODUCTION

This Deliverable reports the outcome of three activities that have been conducted as part of the review of previous relevant experience during WP2 of the WISETRIP project, namely: review of previous EU projects of direct interest to WISETRIP; an international survey of experience with internet-based journey planners (launched in March 2008); and case studies of selected journey planners (including documentation of previous evaluation studies, e.g. Zografos, et al., 2008). Further details of each of these activities are given in the main chapters of this document which forms an Annex to D2.1 (Report on the Analysis of Requirements). The two Deliverables should thus be read in parallel.

The international survey of experience of 25 Journey Planners proved to be a fruitful exercise. Each of the participating WISETRIP Journey Planners is included in the survey as this provides an opportunity to benchmark against current state-of-practice. Particularly interesting results were found for Journey Planners in Denmark, Germany and the Netherlands (which are not represented within the WISETRIP consortium) and these have also been investigated further as part of subsequent data collection exercises which are reported in D2.1 Chapter 4 on system constraints and limitations.

The Deliverable is organised as follows. Chapter 2 forms the extended literature review from the main chapters of D2.1 and review of previous EU projects of direct interest to WISETRIP. Chapter 3 reports the synthesised outcome of the international survey of experience with internet-based journey planners (JPs) while Chapter 4 presents case studies in the form of “mini profiles” all the JPs examined in the international survey. Finally, conclusions and implications for the next stages of the WISETRIP project are drawn. This document also contains several Annexes, namely: a copy of the international survey of experience of 25 Journey Planners (Annex 1) and a consolidated table of results (Annex 2) which are discussed in Chapter 3 of this Deliverable; a copy of the survey of functional & technological issues for Journey Planners to integrate into WISETRIP platform (Annex 3) which is reported in Section 4.1 of D2.1; a copy of the survey of institutional and organisational issues (Annex 4) and a consolidated table of results (Annex 5) which are reported in Section 4.2 of D2.1.
2. FEATURES OF EXISTING PASSENGER INFORMATION AND JOURNEY PLANNING SYSTEMS: A REVIEW OF PREVIOUS EXPERIENCE

2.1. Introduction

Most existing internet-based public transport information systems cover either urban journeys or single mode long distance trips (e.g. through train) and provide static information (i.e. routes, schedules, and fares) and trip planning services. In particular, many metropolitan public transport organizations have developed urban trip planners (e.g. San Diego-MTS, Athens-OASA, Calgary Transit, Vancouver Translink, San Francisco Bay Area-511, Washington Metropolitan Area Transit Authority, Helsinki Metropolitan Area Council, TfL-London), which aim to identify the itinerary that departs or arrives at a given time and minimises one of the three criteria: en-route time, number of transfers, or the walking time. On the other hand the corresponding trip planners for long distance journeys refer to a single mode (e.g. CityRail in Sydney, UK National Rail). A series of recent of EC research projects have been focused on the development of advanced information systems for providing users (travellers and/or tourists) with dynamic travel information and multimodal trip planning services i.e., IMAGE, CRUMPET, Wh@M, ADAMANT, m-Tourist Guide, eMOTION, and IM@GINE IT.

This chapter reports the outcome of the review of previous EU projects of direct interest to WISETRIP. Following a brief review of relevant literature (Section 2.2) the following projects were selected for detailed investigation: IM@GINE-IT, eMOTION, EU Spirit and ITISS (Section 2.3). Prior to this, a brief description of the aims and objectives of WISETRIP are described below to exhibit the relevance of this review chapter.

2.2. Previous relevant work

WISETRIP aims to enhance the present type of journey planning service through a PC or a mobile while on the move application by developing a service for planning multi-modal journeys beyond the borders of European countries or regions by taking into account multiple criteria and complex scheduling constraints. WISETRIP also aims to make a fundamental contribution through the personalisation engine based on multiple personal criteria either defined before the trip or based on real-time data and events to provide instant information to the users. WISETRIP approach is to integrate demand responsive transport (DRT) with other public transport mode concept of the common platform built on top of participating Journey Planners which can enhance the information available to demand responsive transport planning. Furthermore, WISETRIP also aims to deliver a uniform information service drawing on the current and future needs of travellers.

Previous research has highlighted the importance of accurate, good quality information for journey planning (Kenyon and Lyons, 2003). The availability of comprehensive information for the traveller can engender knowledge and confidence, foster positive attitudes towards the service provider and create favourable perceptions of efficiency and security. Indeed, information has become such a vital commodity that one can argue that informed travellers are the key to successful future transport service provision. One of the responses to the need for informed travel
planning and execution has been the development of internet-based journey planners, several of which are described in this chapter. A useful overview of recent information systems (in its widest sense) is found in eMOTION (2006).

Planning a journey constitutes a common decision faced by many travellers. The major complexities of this type of decision relate to:

i) the lack of information on the schedule and the routes of the public transport services,
ii) the difficulty in determining feasible itineraries within the dense urban and/or long distance public transport network, and
iii) the intensive task of assessing alternative feasible itineraries in terms of multiple travelling criteria.

The provision of real-time journey planning services through an on-line advanced public transport information system may alleviate the difficulties listed above (Adler and Blue, 1998; Peng and Huang, 2000) and contribute to:

i) the enhancement of the usability and accessibility of the system by accommodating the users’ need for guidance,
ii) the increase of the level of transport services by identifying transit options complying with the travellers’ preferences, and
iii) the integration of the public transport services by identifying multimodal journeys.

For more than a decade many advanced public transportation systems have been developed providing journey planning services with the objective of determining the shortest itineraries in terms of the en-route time or the cost (Wong and Tong, 1998; Casey et al., 1998; Horn, 2003; Modesti and Siomachen, 1998; Koncz et al., 1996; Huang and Peng, 2001; Bander and White, 1991; Huang and Peng, 2002). Furthermore, journey planning services are now directly accessible to the travellers by on-line web-based applications (Peng and Huang, 2000). One current example is Helsinki City Transport and Helsinki Metropolitan Area Council who are piloting a mobile Internet connection in selected buses and trams to test the feasibility of a Flash-OFDN mobile network as a general communications channel for all information transferred in and out of the vehicle. The public wi-fi connection allows passengers to access schedule and real-time information including a map of the line they are currently on with current location and names of the next stops with estimated arrival times (Lehmuskoski, 2007). Another service using Near Field Communication will deliver real-time information to mobile phones, provide the option of buying a mobile ticket and future options include the provision of news, event information, weather forecasts etc.

Journey planning and the wider context of passenger information provision are moving forward rapidly. The increasing diffusion of information technologies offers potential for providing better multi-modal transport information potentially available for query at any place or time. Furthermore, the opportunity to increase the number of service providers is facilitating the development of cross-modal journey planning and guidance. Crucially, the concept of "service provision" need no longer be restricted to transport services but can now be understand to embrace activity management for which there is a mobility dimension.

On the demand side, advances in personalised information driven by technology changes means that passenger activity management makes travel appear more seamless. However, information technologies have the opportunity to raise the expectations of passengers for higher and better services which may not be matched by the network of services provided. The issues of meeting and managing passenger / customer expectation must not therefore be overlooked as well as the
impact of providing citizens with user-friendly, user-empowered and efficient information. Paradoxically, there is rising expectation from the point of view of the customer for instant information which in turn requires increasing system complexity. This is the area where WISETRIP seeks to make a fundamental contribution. A second paradox is that customers expectation is for information to be provided free of charge while new technology often exerts a heavy price tag (Van Leperen, 2006). To address these issues a selection of relevant previous EU projects are examined in the next section to establish their potential contribution to the WISETRIP project.

2.3. **Review of existing/previous EU projects of direct interest to WISETRIP**

A series of previous EC research projects have been focused on the development of advanced information systems for providing users (travellers mainly focused on accessing transport services and/or tourists with an interest in multi-service / activity information) with dynamic travel information and multi-modal trip planning services; e.g. IMAGE, CRUMPET, Wh@M, ADAMANT, eMOTION, and IM@GINE-IT. eMOTION and IM@GINE-IT are reviewed in more detail here along with two further relevant projects which are considered later in this section are EU Spirit and ITISS.

IMAGE and CRUMPET are focused on the development of intelligent agents’ platforms for providing personalised tourism and travel information. The work in both projects however is oriented toward tourism while travel information is limited to urban trips through public transport. The objective of the WH@M project was the development of an innovative suite of software modules and services for:

i) gathering multi-source (public, private, sponsored) information (tourism, travel, weather),

ii) disseminating this information, through the web and personal mobile services, and

iii) customizing the information dispatched by means of advanced user profiling techniques.

ADAMANT’s contribution is on the interurban trip planning through the air transport network. The objectives of eMOTION and IM@GINE IT are the most relevant to the intended scope of WISETRIP. In particular, eMOTION project proposed a traveller information system which provides the following services: real-time traffic information to road and public transport users, dynamic road routing services, urban public transport trip planning, and other traveller information services such as tourist information via on-trip-devices like PDA/Smart Phones or in-car-systems.

IM@GINE IT aims at the development of an information system through a single access point that provides intermodal transport information, mapping, routing and navigation services in an urban and interurban environment through multiple modes including car. The proposed system provides a step by step interurban multi-legged journey planning service through a PC (connected to the Internet) or a mobile while on the move. The interurban trip planning services of the system are operated separated from the corresponding urban services (by car or public transport). Table 1 summarises the above mentioned projects.
Table 1: Characteristics of previous relevant EC projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Target Users</th>
<th>Sector</th>
<th>Media</th>
<th>Relevance to WISETRIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMAGE</td>
<td>Tourism</td>
<td>Multi-source; Public Transport; urban</td>
<td>Mobile; LBS</td>
<td>M</td>
</tr>
<tr>
<td>CRUMPET</td>
<td>Tourism</td>
<td>Multi-source; urban</td>
<td>Mobile; LBS</td>
<td>M</td>
</tr>
<tr>
<td>WH@M</td>
<td>Tourism</td>
<td>Multi-source Web, mobile services</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>ADAMANT</td>
<td>Tourism/Transport</td>
<td>Inter-urban air travel; within airport</td>
<td>L</td>
<td></td>
</tr>
<tr>
<td>eMOTION</td>
<td>Tourism/Transport</td>
<td>Private and Public Transport</td>
<td>PDA, in-vehicle; real-time; LBS</td>
<td>H</td>
</tr>
<tr>
<td>IM@GINE-IT</td>
<td>Tourism/Transport</td>
<td>Intermodal, urban, inter-urban</td>
<td>Web, mobile services; LBS</td>
<td>H</td>
</tr>
</tbody>
</table>

A useful classification is offered by IMAGINE-IT (2004) who observe that (then) relevant projects could be divided into three main categories:

- Projects focusing on mobile and / or LBS addressing tourist users
- Projects focusing on drivers’ users and in-vehicle services
- Projects focusing on generic navigation / routing and public transport information.

Given their clear relevance to WISETRIP the eMOTION and IM@GINE-IT projects are subject to detailed scrutiny and this is reported below. In brief, eMOTION has developed a system architecture for the integration of existing information services to develop a European approach to multi-modal on-trip traffic information services in real-time. The following information services have been analysed and estimated for its up-to-dateness, type of content owner, types of communication channels and data formats, standards for data models and data access / communication and costs and contractual issues (eMOTION, 2006):

- Road network data
- Public transport network data
- Traffic flow
- Traffic messages
- Public transport timetable
- Dynamic parking information
- Data about points of interest
- Weather data
- Map data

The technical specification of the eMOTION system which is useful for the categorization of data sources is reported in eMOTION (2008).
The remainder of this section introduces four relevant EU projects: IM@GINE-IT, eMOTION, EU Spirit and ITISS. Whilst the detailed technical specification is not described the introduction of the project is intended to give a glimpse of what has been done in terms of implementing an integrated journey planning system. Among the European projects which look at cross-border journey planning systems, the EU Spirit and ITISS projects show similarity to WISETRIP except on the geographical coverage and the media service offered. The comparison of those projects to WISETRIP can be seen in Table 2 below.

<table>
<thead>
<tr>
<th>Project</th>
<th>Target Users</th>
<th>Sector</th>
<th>Media focus</th>
<th>Geographical coverage</th>
<th>Relevance to WISETRIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU Spirit</td>
<td>Tourism / Transport</td>
<td>Intermodal, urban, inter-urban</td>
<td>Web, PDA</td>
<td>Germany, Luxembourg, Denmark, Sweden</td>
<td>H</td>
</tr>
<tr>
<td>ITISS</td>
<td>Tourism / Transport</td>
<td>Intermodal, urban, inter-urban</td>
<td>PDA, mobile services; LBS</td>
<td>UK, Ireland, Germany, the Netherlands, France</td>
<td>H</td>
</tr>
<tr>
<td>WISETRIP</td>
<td>Tourism / Transport</td>
<td>Intermodal, urban, inter-urban</td>
<td>Web, PDA, mobile services; LBS</td>
<td>Greece, UK, Finland, Italy Spain, China, Germany</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 2: Characteristic of on-going relevant EC projects

2.3.1. IM@GINE-IT (URL no longer functional)

This project started from January 2004 with a duration of 24 months and with three collaborators: TRED-IT SA, Daimler Chrysler and Porsche Engineering. The IM@GINE-IT project aims to develop one single access point, through which the end user can obtain location-based, multi-modal transport information (static and dynamic), mapping and routing, navigation and other related services everywhere in Europe, anytime, taking into account personal preferences of the user. Thus, IM@GINE IT targets the facilitation of seamless travel in Europe. The system takes into account personal preferences and trip context, and provides the service through many different mobile devices (mobile phone, mobile PC, PDA, in-car device). IM@GINE IT intends to become a universal platform, covering urban, interurban and cross-border areas.

The IM@GINE IT Methodology

The system’s functionality is described through (IM@GINE IT, 2004):

- A list of system architecture requirements combining:
  a) generic system requirements, and
  b) specific system requirements, namely profiling requirements & HMI requirements.
A key task has been the identification of the main IM@GINE-IT service stakeholders, namely end users and service providers, as well as their sub-categories. The service provider category covers all business entities that provide content, applications and services for the delivery of the final IM@GINE-IT service.

The opinion and views of the service providers have been surveyed and survey results have lead to a list of “Business expectations and needs”, which are the key driving force for the project’s research and development activities in view of the system’s roll out and exploitation plan.

The next significant work module has been the functional analysis of the envisaged system’s services, which included the following steps:

- Analysis of trip requirements; IM@GINE-IT is beyond and above all a trip planning and support application, and its basic features concern the execution of a trip by the end user.
- Identification of end user’s basic needs with respect to location-based trip planning and support.
- Abstract functional description of how the system’s services could satisfy the users’ basic needs and trip requirements.
- Output requirements: what is the expected outcome of the system per user basic need according to different scenarios of trip context and transport modes?

The results of the functional analysis work module have been used for the definition and description of the system use cases, which have also been prioritised according to significance of associated end user basic needs and service provider expectations. The use cases have been bundled to provide a list of possible service scenarios (i.e. complete set of end user’s interaction with the system for the satisfaction of a series of needs). Finally, storyboards have been prepared, in which the logical sequence of the use cases within the system’s “business model flow” is presented.
Figure 1. Interaction and conventions between work modules

Figure 1 shows the interaction and conventions between the above-described various work modules and their results, within the framework of the use case analysis (IM@GINE-IT, 2004).

The following methodological tools have been used for the work:

- Survey with questionnaires addressed to service providers
- Bibliographical review
- Expert analysis by members of the consortium, using standard methodologies such as usability engineering life cycle, requirement definition and analysis etc.

The basis for the IM@GINE-IT work is the results from previous research work in the same area, and which are considered as the state-of-the-art at the time of project’s commencement.

Given that IM@GINE-IT is a rather complex system, it was decomposed (i.e. to identify what the various characteristics of the system and the service are) so as to simplify the process of locating information from previous existing work in the areas of interest.

The type of characteristics for the first part of the user requirements and functional analysis, on which the decomposition was based were as follows:

- Timing of user request (for example, pre-trip information)
- Travel environment (for example, urban trip)
- Client device (for example, in-vehicle device)
- Application related features (for example, multi-modal information, location-based information etc.)
- Consumer behaviour and privacy
- Services (for example, navigation or public transport information)
- System’s building blocks (for example, intelligent agent systems or GIS systems)

Business expectations and needs were addressed via a questionnaire. The objective was to identify technical, market/business, institutional/legal and functionality needs, requirements and expectations of service providers, i.e. the main business entities that were expected to participate in the IM@GINE-IT system. In any such system the service providers’ needs are the main driving forces for the design of the system as well as the expected roll-out and deployment.

The IM@GINE IT project aimed to amplify the basic concept of info-mobility services, yet provide easy access and use to its end users, while also facilitating pan-European service providers’ cooperation. In this perspective, the results of the service providers’ survey lead to the following relevant conclusions (IM@GINE-IT, 2004):

i) The infomobility market sector still faces technological constraints, especially with respect to limitations in tele-communications, but most importantly with respect to immature market conditions and limitations in budget.

ii) Therefore the project’s business plan should focus on most appropriate technologies and market for the final service/product; most promising aspects of the system seem to be the
integration of nomad devices with in-vehicle platform, and accordingly of pedestrian-public transport applications with car applications.

iii) Participating organizations believed that IM@GINE IT would add value to their existing suite of services, especially in improving the existing functionalities concerning multi-modal transport services and the supplied information to the end user. In summary, the responders believed that IM@GINE-IT can become a viable business platform for devising Euro-regional strategic alliances.

The resulting IM@GINE-IT system offers location-based trip planning and support. The system should therefore satisfy trip requirements and support user’s basic needs. The analysis includes description of trip requirements within system scope, as well as identification of user’s basic needs and questions while on a trip, and aims to provide a generic functional description and more specific output presentation requirements according to parameters affecting this output. Service provision requirements will differ according to the following:

- User's purpose of travel (business, commuter, etc.)
- Travel mode (car, public transport, etc.)
- Level of travel (within buildings, urban, interurban)

Further detail of the functional analysis and use cases can be found in the IM@GINE-IT Deliverable 1.1: Use cases and user / vehicle profile requirements (IM@GINE-IT, 2004).

2.3.2. eMOTION http://www.emotion-project.eu/

eMOTION is a co-operation between public authorities, transport service operators, telecommunication operators, IT suppliers, research centres, and transport consultancies from Austria, Belgium, Czech Republic, Germany, Italy, Slovenia, and Spain with the aim to investigate, specify and assess multi-modal, on-trip traffic information services for European travellers. eMOTION started in May 2006 for a two year duration project of which partly funded by the European Commission under the SUSTDEV Programme. The main aim is to investigate and specify the framework for a Europe-wide multimodal traffic information service offering real time information and special services for the road and public transport user. These services will make information and various types of digital contents available for European travellers via on-trip-devices like PDA/Smart Phones or in-car-systems.

The main goal of the eMOTION framework is the specification of a system architecture that is able to integrate existing information services in order to develop a European approach for a multi-modal on-trip traffic information service. The following tasks are the topics of eMOTION first work package:

1. Review of current practice in European multi-modal real-time traffic information services,
2. Analysis of stakeholders and actors needs and requirements, and
3. Definition of services, service chains and implementation approach

An important basis to detect relevant services in the scope of eMOTION framework is the distinction between "Minimum ITS Services" and "Common ITS Services". The Minimum ITS Services are "considered as being essential and should become available in all Member States" whereas "Common ITS Services "should be compatible wherever available".

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The analysis has shown that end user services existing so far are provided by different types of service providers depending on information content (eMOTION, 2006). The service providers are either public like national, regional or local administrations, or private like companies for telecommunications. Some services are provided by broadcasting stations. The services are offered using one or more of the following end user devices (depending on service type): in-car system, stationary internet PC, mobile internet device (PDA), Smart Phone, mobile phone, phone, info terminal/kiosk system or infoscreen. In correspondence with respective end user devices only delimited types of visualisation are possible. Most devices are able to communicate textual information via screen or as voice, but displaying maps, animations or video streams requires adequate technical equipment.

There is a wide range of services offered free of charge. Others generate costs for software, data-updates, e.g. on CD, or for every single usage of the service in the meaning of "pay per click". The geographic coverage of provided services varies depending on necessary data from local or regional (e.g. parking information services) by national (e.g. personalised real-time passenger information) to international (e.g. dynamic route guidance) providers.

Within the analysis of existing services some standards were identified. National, European or international standards are used for traffic/transport information services. In the case of road network data GDF has to be mentioned, for traffic messages RDS-TMC, Alert-C, Datex (Datex2) and OTAP are relevant. Especially for multi-modal trip planning OGC® web services are used.

As relevant content for multi-modal real-time traffic information services, local, regional, national and international data sources have been analysed regarding road network data, public transport network data, traffic flow, traffic messages, public transport time table, dynamic parking information, data about points of interest, weather data and map data (eMOTION, 2006):

Each identified data source has been estimated regarding up-to-dateness, type of content owner, types of communication channels and data formats, standards for data models and data access / communication as well as costs and contractual issues. It was not the aim to describe all special details of databases but to distinguish aspects which are of relevance in the eMOTION framework.

The process of generating suitable information by different services and providing it to end users presupposes the participation of specific actors in the value chain. The source of all information services is a content owner or content provider who owns the content (e.g. traffic data) and/or provides the content for service application. A service operator uses this content to generate information with added value. The information is part of a service and covers not only the adaptation of the original data but also the visualisation of the information. The service provider is the face to the customer. He publishes the service and is responsible for all marketing and contractual issues with the end user. To publish the service the service provider needs a network provider who supplies the communication network for the service (like a mobile network or an internet provider). The end user is the consumer of the information service.

The flow of content in the value chain is inseparably associated with costs by providing data or services that can be charged to the end users account. This interaction of pricing and billing has been considered by basic business models. According to the different ways in which revenues are generated, different revenue stream models suitable for information services have been identified too.
All actors in the value chain represent user groups of the eMOTION framework. The different groups of actors like content provider, service operator or service provider and end user have different requirements to the eMOTION framework because of their different function in the value chain and their different business models. Requirements affect legal, technical, organisational, financial or general aspects (requirement groups) and come along with responsibilities of one or more actors in the value chain of information services. The "commercial" requirements of the different public and private actors in the service chain lead to a list of "Business expectations and needs".

The analysis of functional aspects of the eMOTION system leads to trip requirements (requirements that are added to the type of trip), basic end user needs with respect to dynamic on-trip information services that are the basis for a functional description and the definition of output requirements for the eMOTION system. The functional description and the user and stakeholder needs are the source for definition of use cases or service scenarios.

Further detail of the architecture repository and data model can be seen in the technical specification document of Deliverable 6 (eMOTION, 2008).

2.3.3. EU Spirit [http://www.eu-spirit.com/](http://www.eu-spirit.com/)

EU-Spirit: European system for passenger services with intermodal reservation, information and ticketing is a European travel information service offering the calculation of itineraries between European cities and regions with regard to public transport. EU-Spirit itself is not a travel planner but a compilation of already existing Internet-based information service systems for short and long-distance traffic. EU-Spirit is used in such cases as when a customer, not only wanting to travel inside one city or region, is in need of an itinerary between different European regions.

EU-Spirit is the result of a European research project which started in December 1998 led by Deutsche Bahn AG with 37 partners from 7 European countries. The consortium collaborators include national and local public transport operators, system developers, research institutes, consultants and regional authorities. After the project’s end in 2001, the project partners decided to continue the provision of the EU-Spirit service. Today’s providers are:

- Northern Germany (Niedersachsen, Bremen, Hamburg, Schleswig-Holstein)
- NVBW Nahverkehrsgesellschaft Baden-Württemberg, Germany
- Rejseplanen (Denmark)
- Samtrafiken, Sweden (National bus and rail services)
- Skanetrafiken, Sweden (Skane region, Southern Sweden)
- VRN Verkehrsverbund Rhein–Neckar, Germany
- VBB Verkehrsverbund Berlin-Brandenburg, Germany (co-ordinator)

In 2007, the following are in the process of setting up the EU-Spirit service:

- CDT Communauté des Transports, Luxembourg
- VGS Verkehrsverbund-Gesellschaft Saar, Germany
- SL - Storstockholms Lokaltrafik AB, (Stockholm, Sweden)
With regard to long-distance traffic, information on trains and flights is available. EU-Spirit is an information service system which aims at covering the whole of Europe. Therefore, all operators of national, regional, and local Internet-based travel information service systems are invited to participate in the EU-Spirit group.

EU-Spirit is open to new providers. They can be operators of national, regional or local Internet-based travel information service systems. The costs of the central EU-Spirit components are shared by the providers and paid in form of an annual fee. The fee comes up to an amount between 9,000 and 18,000 EUR. Additionally, one-off expenditures arise in order to connect the new travel information service system to the central EU-Spirit components. The amount of the costs depends on the respective system and will be paid by the new provider. In general, the amount is between 2,500 and 5,000 EUR.

2.3.4. ITISS [http://www.itiss-eu.com/](http://www.itiss-eu.com/)

ITISS: Intermodal Travel Information SystemS, started in September 2003 with funding provided by INTERREG IIIB, and aims to develop a travel portal giving integrated intermodal transport information allowing the international traveller to plan door-to-door journeys before he/she leaves home. It will track your journey and the user can check for updates/changes en-route so real-time information is at users’ fingertips. If users register on the site, it will store their personal details and their journey details so they build up a travel profile. Users will be able to retrieve journeys for future use rather than entering all the details again. The scope of the portal has been demonstrated on the Manchester-Cologne corridor using local and international travel information. ITISS brings together 5 cities / regions within North West Europe (NWE) which are facing similar problems of high levels of traffic congestion. Congestion on urban road networks within the NWE region is also recognised as a major area of policy interest within both the INTERREG IIIB programme and the initiatives of DG TREN.

Traffic congestion is a major problem in many cities and regions across North West Europe and beyond. There are a number of reasons why traffic congestion has become such a significant problem in our towns and cities, including the desire to optimise travel opportunities, the decentralisation of essential facilities and services and reluctance to rely on public transport services. The ITISS partners firmly believe that another key factor contributing to congestion is the fact that travellers are not able to access accurate, up-to-date travel information when and where they most need it, for example when arriving into an unfamiliar city by air or rail.

ITISS aims to improve the content of and access to traveller information services for a wide range of travellers in and between 5 partner cities / regions across North West Europe. In order to meet this aim, the partners will share existing knowledge and experience and explore the options for making information about their services available in other partner cities, providing a transnational service. The proposed services will be delivered through a range of channels including the emerging innovative mobile devices to provide multimedia information services. All of the partners have a number of existing services and databases of travel information; the main emphasis of this project will be delivering information from these systems to a range of media, particularly to mobile devices. The project will also consider making multi-lingual information available and using natural language interfaces to systems and services. A key innovative aspect of the project will be
to provide access to travel information while the user is on-the-move. At present much of this type of information is provided either through the internet or via call centre services, although a small number of "alert" type services using SMS messaging to mobile devices are also available. An important element of the project will be the development of location-specific information and services based on the use of mobile devices and Personal Digital Assistants (PDAs). The project intends to provide easy and fast high-quality services of general interest, brought together under a common architecture to ensure inter-working, compatibility, user-friendly-access, privacy, use of open standards and market take-up. Partner cities will seek to make their information services available via remote access in other cities.

The end result of the project is services that could be implemented in other places using similar architectures and technologies and the opportunity to develop direct information links between cities and partners, thereby creating the idea of a 'European Travel Information Web' (ETIW).

**ITISS Travel Portal**
(Source: ITISS newsletter vol. 3, September 2006)

This Web based travel portal combines travel related services from different sources. For the main demonstrator the portal will integrate the travel planning engines from Transport Direct in the UK and PTV and its partner HACON for Germany and Europe. Users will be able to plan inter-modal trips from Cologne to Manchester by combining different sources of travel information. These sources will be linked through modern XML based Web services to the travel portal. They will provide information on tram links, trains, flights, car routes or pedestrian routes. By registering on the site a user can retrieve his/her planned journey online while he/she is travelling. A user can save the trip for later use, or can evaluate alternative trips and select the one that suits him/her best. A travel portfolio will allow user to save trips and reuse them later. The travel planning engine will suggest inter-modal alternatives (that is, using different travel means on the same route) from door to door.

In addition to the travel information portal, local services have been developed in the following partner sites: Greater Manchester, United Kingdom; The Hague, Netherlands; Cologne, Germany; South Dublin, Ireland; and Pays de la Loire, France.

**Market Segmentation Study for the ITISS Travel Information portal**
(Source: ITISS newsletter vol. 4, March 2007)

During the Summer of 2006, each partner of ITISS conducted surveys to get an insight into the travel behaviour of the potential target audience for the travel information portal. This article highlights the main results of the 309 questionnaires sent back from Germany, Ireland, France and the Netherlands.

Current usefulness of travel information sources:
When travelling abroad, people like to rely on real-time passenger information at stops and in general find it the most useful source. The second most favourite is using the internet at home.
before travelling to get the information required. There are no major differences between the countries but those that are significant are highlighted. The Germans like to print off their information from the internet; the Irish like to make a telephone enquiry (while Germans do not find this useful); the French like on-street kiosks but not on-vehicle information.

Using mobile phones and PDAs to receive travel information while travelling is not deemed to be a useful source. In fact, the majority of people do not actually own 3G or PDA devices. Neither do people envisage purchasing these in the near future.

Three levels of service had been offered by the ITSS Travel Information Portal:
Level 1: This travel information portal will provide users with a ‘1 stop shop’ for planning and tracking their journey between European cities, from starting point to final destination. Level 1 is the most popular, especially with French respondents.

Level 2: Having pre-registered a journey as described above, during a trip, users will be able to use their PC or PDA to log onto the system and get the latest real-time information about local travel conditions, so they can make changes if needed. The system will also store their journey information, so they can retrieve it in the future for your regular journeys.

Level 3: During a journey users will be able to get extra help with travelling and adjusting their journey, by registering for SMS message alerts about travel problems, such as delays, roadworks, and congestion. As at level 2 the system will also be able to store the users’ journey information, so they can retrieve it in the future for their regular journeys. Almost 30% of the respondents are willing to pay for the service offered at level 3.

There are some differences between the countries with the Irish and the Dutch being most willing to pay at each level.

For the survey on the increase use of public transport using the portal, it was revealed that the Irish are most likely to be influenced by it whilst the Germans are the least likely.

**ITISS Transnational Workshop**
(Source: ITISS newsletter vol. 5, August 2007)

The workshop has outlined the advantages for cities to participate in transnational projects, such as:

- To advance developments sooner than possible on your own.
- Building critical mass for R & D.
- Developing your staff by exposing them to new ideas and new people.
- Giving a focus and structure to your measures that they otherwise would not have.
- Networking with others of a similar professional background but from different cultures.
- Building your political reputation as an innovator.

It was in this context of striving together to achieve greater sustainable development that ITISS consortium organised this transnational workshop. The ITISS project is developing an international journey planner.
A number of conclusions from the ITISS portal last workshop generate some useful advices which WISETTRIP can draw attention to includes:

- Involve the major players, such as Transport Direct (UK) and PASSIM (France).
- Gain political backing and with it the financial backing needed to bring the product to market.
- Bring a complete, not a partial, solution to the end user.
- To do this it needs to be on a larger scale.
- Keep up with advances in mobile technology and the increased demand for Real Time Information, e.g., near field communication.

2.4. Conclusions

Four previous EU projects are particularly relevant to WISETTRIP: IM@GINE-IT, eMOTION, EU Spirit and ITISS. As Errore. L’origine riferimento non è stata trovata. shows IM@GINE-IT has developed a system which provides a single access point through which the user can obtain location-based, multi-modal transport information (static and dynamic), mapping and routing, navigation and other related services. These services should be available everywhere, anytime, taking into account the personal preferences of the user (IMAGINE-IT, 2004). Of particular value to WISETTRIP is the use case analysis which covers the following activities: administrative, trip planning, active trip and push events. Among the European projects which look at cross-border journey planning systems, EU Spirit and ITISS projects show similarity to WISETTRIP except on the geographical coverage. Although EU Spirit project has started some years ago which attempted to collaborate between cross border European countries intermodal journey planning system, the service continues for a fee and can be seen as a catalyst to demonstrate the need for such a concept to be expanded and extended. The more recent ITISS project shows that application of cross border intermodal journey planning system can be challenging. The markets of different European countries, the standardisation of data and the different co-ordinate systems that are used across Europe are some of the challenges revealed from the project up to now for which WISETTRIP can learn to anticipate when the same problems arose.

It is clear however from this brief review of experience that there is an opportunity to provide a service for planning and executing multi-modal journeys beyond regional and national boundaries and this is the area that WISETTRIP seeks to address. This observation is confirmed by the results of the international survey of experience which are summarized in the next Chapter.
3. FINDINGS FROM THE INTERNATIONAL SURVEY OF EXPERIENCE WITH INTERNET-BASED JOURNEY PLANNERS

The information in this Chapter has been collated following an international survey of Internet based Journey Planner systems conducted by the WISETRIP consortium in March 2008 with support from ITS UK. The survey resulted in information being provided for a total of 25 Journey Planners from 8 European countries plus China and Japan.

Overall, 11 main features of existing Journey Planners (JPs) have been identified and information on each feature was captured through the survey questionnaire (Annex I). A summary table collating all 25 survey responses is provided in Annex II.

The main variations in the features of each system are highlighted below and the key priorities for further development identified by those responding to the survey are summarised at the end of the section. Chapter 4 presents case studies in the form of “mini profiles” all the JPs examined in the international survey.

3.1. Mode type covered

Half the responses received related to single mode journey planners. Journey Planners which deal only with one motorised mode are considered as single mode even if they include walking times at the start and end of journeys or at interchange points. Most single mode JPs provided information on bus services although there were examples of rail and private car single mode JPs provided. There appears to be 2 groups of multimode JPs; those offering public transport solutions by a variety of possible modes and those which offer private car journey information in addition to public transport options to enable car owners to make informed decisions about whether to drive or not. Car parking information is also provided by some JPs, e.g. Transport Direct (UK).

Although DRT is seen as a 'bus' by end users, JP's need to deal with fixed route bus and DRT very differently. As yet it appears that the vast majority of JPs have not yet come to terms with how best to represent DRT services and only one (the German The Intermodal Journey Planner by Mentz DV Munich) out of 25 survey responses claimed to include a representation of DRT in the results returned to users. For this JP Demand Responsive Transport (DRT) is included by trip-related notes. In the future a central notification procedure for these trips will be implemented. The system should then be able to transmit the notification to the responsible transport operator.

3.2. Info provided to user

Route information is provided by all JPs responding to the survey and schedule information for all but one. Availability of information on fares appears to depend on the mode as well as national regulation. For instance fare information is common for rail based JPs and also long distance bus travel but local bus fare information is less commonly available. The estimated cost of a car journey can be obtained from several JPs offering private car journey information. Walking times
are generally provided for the start and end of the journey and for any interchange required except for some single mode JPs and for private car only JPs. It is noticeable that the JPs described for China lack this piece of information despite including public transport modes.

Some JPs also offer information on CO₂ emissions for a car or public transport for a specified journey. Although some local JPs only provide information in the local language, most national JPs provide information in at least the local language as well as English and in some cases in the languages of neighbouring countries.

3.3. **Geographic Coverage**

Almost ¾ of the JPs reviewed provided information at the local or regional level and less than half provided information on a national basis. Less than a ¼ claimed to be international, although most of these related to JPs in relatively small countries which have integrated transport networks with neighbouring countries. A notable exception to this is The Trainline JP in the UK which provides rail information across Europe.

3.4. **Information display**

Map based information supported by tabulated results are the most common means of presenting the results to the end users. In a number of cases this is accompanied by route diagrams. Only one JP (Google Transit Firenze in Italy) currently utilises Google Maps to display the information.

3.5. **Criteria to calculate itineraries**

Almost all JPs reviewed calculated itineraries based on minimising en-route time as well providing the option of minimising number of transfers. The Finnish, German Danish and Japanese JPs also allowed minimising walk time. A couple of UK JPs which allowed rail based ticket booking also provided itinerary optimisation based on minimising cost. Three particularly interesting JPs regarding criteria used to calculate itineraries are: the ENOSIS Urban Journey Planner from Greece in which lexicographic ordering is used in order to determine optima itinerary using all the criteria simultaneously; the Intermodal Journey Planner from Germany generates automatically the fastest connections based on personalised user specified criteria including transfers, walking speed, exclusion of means of transport, barrier-free routing; Transport Direct from the UK can calculate car routes based on minimum en-route time accounting for predicted traffic levels at different times of the day so the user can make informed decisions about when to travel.

3.6. **Other content features**

Many respondents stated that real-time information was provided but this often related to travel news updates on traffic conditions and delays for presentation on the JP web-site but did not provide real time data used in the JP route optimisation or to ‘alert’ users of real time delays to previous journey details. Notable exceptions to this are: The ENOSIS Urban Journey Planner from
Greece provides real-time information available via SMS or E-mail (according to the user’s profile) about delays or cancellations for air routes to Athens International Airport and ferries at Heraklion port; Greek City Journey Planners provide real-time forecast for urban bus arrivals and departures; the Dutch 9292ov JP provides real-time congestion and delays for public transport; Yahoo, Route Selection in Japan uses on-line real-time information according to the actual operational status of all modes of transportation covered by the JP (bus, rail and air).

Although it appears that only the Greek and Dutch JPs have an ‘alert’ facility for updating information by SMS while the traveller is en-route, there are plans to introduce this feature in several other JPs.

Just over a third of the JPs reviewed stated they provided other services. These often took the form of travel agency information, point of interest tourist information and links to other tourist services. Weather forecast information is available via a few JPs.

The Traveline JP also provides the txt2traveline service allowing texting an 8-digit bus stop reference code to return the departure times of the next few buses from your chosen stop. The message can be customised to allow choice of destination, specific bus service, time period or date. The service is automated and operates 24 hours-a-day, every day.

Page landing wizard is another interesting development in the use of journey planners. This enables 3rd party websites to embed the JP planner onto their sites. This is provided by the Traveline JP (UK) and Rejseplanen JP (Denmark).

Other interesting features include a carbon calculator to enable users to see how much travelling by train can help to reduce their carbon footprint in the The Trainline JP (UK).

Dynamic travel information is only provided in 4 out of the 25 JPs surveyed. In the German Intermodal Journey Planner dynamic information is provided based on their Content Management System. Latest information on blocked routes and route diversions can be given route-, trip-, and direction-related. Alternative routes are provided in addition to notes showing restrictions of normal service.

Ticket booking is only available at 20% of the JPs reviewed and related to only rail travel or long distance bus travel in the case of the Megabus JP (UK) where only one operator is involved. Where ticket booking is available the JP must also provide itinerary storage and update facility.

The The Trainline JP (UK) provides the Mobitix system allowing customers to receive their tickets directly to their mobile phone. The tickets contain a number of visual security checks and can be inspected using handheld ticket checkers. The Print@home system allows tickets to some train operators to simply buy their ticket via TheTrainline and print it on ordinary plain A4 paper.

3.7. **Other media for accessing info**

The journey planners reviewed from UK, Finland, Germany, Denmark, Greece and the Netherlands generally enable communication and information exchange via SMS, while those from Italy, Spain,
China and Japan do not. Kiosks or terminals are rarely used now in the countries with more established mobile communication infrastructure however these are still found in China where the mobile penetration rates and internet connections are still relatively low, but growing rapidly. Telephone call centres still form an important part of the JP package in more than half the responses received. This human interface is still viewed as essential for large sections of the population who are not PC literate or have access to internet and mobile technologies.

3.8. Limitations of existing JPs

The main limitations for many of the JPs reviewed related to difficulties experienced in the supply of data. Problems mentioned included: differing data formats provided by different suppliers of data; gaps in service data provided to the data manager; unwillingness of some transport operators to provide data; difficulties of updating and maintaining large quantities of data from many different sources; frequency with which changes in service data occur. A lack of real time up-to-date of information was also mentioned as a problem.

3.9. Key Priorities for the next 5 years

In Italy the key priorities for further development included improvements of cartography to display the information with higher clarity and quality and optimising the transfer of data between the transport operators and local Agencies to the JP manager. The aim is to reduce the time spent on this and to increase the quality of data supplied. A single format to collect and provide the data to the JP manager needs to be introduced.

In the UK key priorities mentioned included development of smartcard technology for the train industry and other technologies making ticket purchase simpler and less labour intensive. Further improvements to rail journey planning and mixing a car journey with Public Transport so you can plan a ‘Drive and Ride’ journey more easily was also desired.

In Finland further development in the integration of dynamic data and inclusion of all modes as well as demand responsive transport was identified as a priority. Improvement of scope and quality of the data is the main development aspect for Journey.fi service. Other key priorities are use of real-time data (e.g. delay information) and storage and exploitation of history data in personal taxation (e.g. need to use private car for commuting). Further development possibilities of ferry, private car and fare data are being investigated. A target is that the Journey.fi journey planner will be used in city planning as well as in defining necessary density of public transport.

Key priorities for the German Intermodal Journey Planner include use of real-time-information, dynamic creation of network route maps, stop indexes, location maps, and GPS-routing for mobile devices. It was pointed out that Journey planners are subject to continuous changes responding to advanced in technology and to requirements of the user.

In Denmark the main priority is real-time implementation since this is central for the development of more personalized services which will be the core focus in the future for the Rejseplanen JP. The possibility to provide personalized information both before, during and after the journey will give the costumer an added value which will bring more people into public transportation. It is planned
to connect to the users where they are and in the situation where they need to use it, so basically to be mobile; on mobile phone or car navigation etc. Demand Responsive Transport is under development and will hopefully be available in 2008.

Key priorities in Greece include full scale multi-modality, real-time travel time updates and the development of dynamic routing. Also important is developing instructions to guide travellers during mode interchanges (preferred exit/entrance and how to find it) and instructions on which platform or station to stand in order to get on the vehicle going on the right direction. Delivering reservation and tickets as easy as possible, on A4 paper or through the mobile devices is also being considered.

The Netherlands JPs are interested in providing up-to-date, real time and reliable information to travellers en-route.

In China the key priorities identified were to display map based information to the users and to add fare information to the system, while in Japan the priority for the Yahoo, Route Selection JP is to develop a rail JP.
4. CASE STUDIES OF INTERNET-BASED JOURNEY PLANNERS

This Chapter presents case studies in the form of “mini profiles” all the JPs examined in the international survey. These include the five participating WISETRIP JPs, namely:

- **Italy** “Busbussola” - Public Transport JP of ATAF Spa (Florence Public Transport Company)
- **UK** Traveline Scotland
- **Finland** Journey.fi route planner
- **Greece** ENOSIS Urban Journey Planner
- **China** Hangzhou Bus, Hangzhou Public Transport Corporation


[www.ataf.net](http://www.ataf.net)

“Busbussola” is a single mode – bus/coach – journey planner. The information is provided in Italian which includes routes, schedules and walking time within local/regional coverage. The information displayed comprises of route diagram in tabular form as can be seen in Figure 2 and map as can be seen in Figure 2, and a minimum en-route time and transfer time are also calculated and generated for the user. Busbussola is funded locally by ATAF with its own resources and is maintained daily by consultant (ATAF Spa) with the data provided from transport operator (ATAF) and infrastructure provider (Municipalities of the Florence Metropolitan area).

<table>
<thead>
<tr>
<th>DEPARTURE</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>From Cavour walking about 239 meters to reach the bus stop RICASOLI - GRAN CAFFE’ SAN MARCO</td>
<td>F</td>
</tr>
<tr>
<td>Catch the line 17 (-&gt; VERGA 02) at 09.34</td>
<td>☑</td>
</tr>
<tr>
<td>Drop off at the bus stop SETTE SANTI at 09.45</td>
<td></td>
</tr>
<tr>
<td>From the bus stop SETTE SANTI walking about 114 meters to reach Viale dei Mille</td>
<td></td>
</tr>
</tbody>
</table>

**ARRIVAL**

![Figure 2. Tabular information format generated by Busbusolla JP](http://www.ataf.net)
It is possible to extract the page contents and to insert in a new file, but they cannot be stored directly on the JP system or updated. ATAF Spa owns the Busbussola JP. Overall data management is provided by ATAF Spa. ATAF provide the data for the public transport services and the Municipalities of the Florence Metropolitan area provides the data for the information on the interruption and diversions to the network. There are some difficulties in updating the mapping. No consolidated evaluation has been undertaken but comments from users have been recorded.

Figure 3. Map generated by Busbussola JP

4.2. **Italy: “Timetables search engine” Public Transport JP of Autolinee F.Ili Lazzi Spa**

(uurban and extra urban public transport operator in different areas of the Tuscany Region)

“TIMETABLES SEARCH ENGINE!” is a single mode – bus/coach – journey planner with multi-lingual provision: Italian and English. The information provided for the user includes routes, schedules, and bus fares and it covers the local/regional area. The displayed information comprises of route diagram and tabular form with a minimum transfer time itinerary being calculated. Itineraries can be printed by the users and stored in paper format. It is possible to extract the page contents and to insert in a new file. But they cannot be stored directly on the JP system or updated. A link to the “Lazzi Express” Travel Agency is on the JP home page is provided. TIMETABLES SEARCH ENGINE is funded and maintained daily locally by L.A F.Ili Lazzi Spa (consultant) who is the owner of the JP.
4.3. **Italy: “Google Transit” JP of the overall area in the Province of Florence (Italy) Google Transit Firenze**

http://www.google.com/transit

“Google Transit” is a multi-modal – bus/coach and private car – journey planner with multi-lingual provision in Italian and English. Google Transit is a Map-based JP (Google Map Tele Atlas) that combines visual information to the route diagrams, bus stops and time to be spent in the trip. In the JP you have a link to local agency information (helpful for any last-minute news, service changes, or disruptions). Other services to the users can be reached by the Google search. Information about routes, schedules and walking times within local/regional coverage are provided by the JP. The display information includes route diagram, map base and Google Earth with the minimum en-route time itinerary being generated. Google Inc owns the JP and provides private funding at the national level.

Data are updated on the system when it is requested and notified by the owners of information (usually every 20-30 days). The Province of Florence (the data owner together with the transport companies) converts the data to Google format and uploads this in the “limited access section” of their own web server; the Province sends a message to Google provider. Google is charged to download the data by the web server using the username and password received by the Province of Florence. Google replaces the ‘old data’ with the new data entry on the Journey Planner. This update is made by Google but not in real-time. It takes almost one week to replace the data after receiving the notification by the Province of Florence. During this time, the system displays the old data to the users. The transport companies that operate the public transport services in the Province of Florence are the data providers to the local Authority (the Province of Florence). The local Authority provides Google with the three transport operators’ data. The Province of Florence is managing the data of the transport operators even if the data ownership belongs to the transport operators.

The Main limitation of the JP is that there is not real time up-to-date of information on the Journey Planner when it is requested by the Province of Florence (see above). Other gaps in the service, from the point of view of the data owner, are the relevant time spent by the Province of Florence to convert the original data into the Google format.

4.4. **Italy: “Mobiliter” Emilia Romagna**

http://www.mobiliter.eu/

“Mobiliter” is a multi-modal – bus/coach and rail – journey planner. The information is provided in Italian and English. The information provided includes routes, schedules and walking time within local/regional coverage in a tabular format. The owner is the Region of Emilia Romagna. The maintenance of the JP is undertaken by CUP 2000, which is a joint stock company owned by the Region of Emilia Romagna and other local Municipalities and Health Agencies. It is an “in-house” company that has developed relevant experiences in ICT and in the management of different users’ services. CUP 2000 was created to manage the information related to the Regional
Health Service. Data are updated when necessary. The transport companies that operate the public transport services in the Region of Emilia Romagna and the Local Mobility Agencies operating in the Region, are the providers of the transport service data to CUP 2000. CUP 2000 is responsible for overall data management. The main deficiency of the Mobiliter JP is that the data received by the manager of JP are in different format and it takes time to convert them into a single format. An homogeneous source of data could save work for CUP 2000.

4.5. **UK: Megabus**

www.megabus.com

Megabus is a single mode – bus/coach – journey planner. The information provided is in English which includes routes, schedules and fares within national geographic coverage. The information display for user is only in tabular format. Users can register as a regular user allowing storing, tracking and editing of reservations. £1 fee is charged for changes to reservations. Routes are calculated from Megabus Route Timetables giving the customer the choice of times and prices to suit their needs. Megabus is owned, privately funded and data managed by Stagecoach Plc.

4.6. **UK: The trainline**

www.thetrainline.com

The Trainline is a single mode – rail – journey planner. The information provided for the user includes routes, schedules and fares in English which covers local/regional, national and international journeys. The display information is only in tabular format with minimum en-route time, transfers and cost are generated. Users can register as a regular user allowing storing, tracking and editing of reservations. £10 fee is charged for changes to reservations. The JP is privately owned and managed by Trainline.com Limited. The Trainline can be accessed by mobile phone by browsing to http://m.thetrainline.com where you can check train times, fares and availability all from the palm of your hand. Very soon it will be possible to buy tickets via mobile phone. Using the Mobitix system customers can receive their tickets directly to their mobile phone. The tickets contain a number of visual security checks and can be inspected using handheld ticket checkers. Print@home system allows tickets for some train operators to be bought via TheTrainline and printed on ordinary plain A4 paper. Another interesting feature is a carbon calculator to enable users to see how much travelling by train can help to reduce their carbon footprint. Key priorities for further development: development of smartcard technology for train industry and other technologies making ticket purchase simpler and less labour intensive.

4.7. **UK: Transport Direct**

www.transportdirect.info

Transport Direct is a multi-mode – bus / coach, rail, ferry, air and private car – journey planner with multi-lingual provision: English and Welsh. The information
provides includes routes, schedules, fares and walking time within local / regional and national geographic coverage. The displayed information includes route diagram, tabular form and map as seen in Figure 4. Figure 4 also shows the itineraries generated by the JP which includes minimum en-route time, transfer time, walking time and cost.

You can plan a journey in a number of different ways to suit your needs. Using door to door JP user is presented with table of options by all selected modes optimised by time or min number of changes.

Figure 4. The displayed information generated by Transport Direct JP
This is also presented in route diagram form and on maps for car trips. Step by step directions and details of connections can be provided. If the mode of travel is known then users can go straight to the ‘Find a train’, ‘Find a flight’, ‘find a car route’ or ‘find a coach’ options. Searching by price is available for train journeys. Once you have found a journey you want, you can add further parts to your journey or amend some or your entire journey. Once you have found a journey, you can save it as a bookmark in your browser and retrieve it at a future time from the ‘Favourites’ menu in your browser. Car parking information is also available. Real time information on incidents and delays is provided in an incidents window but the impacts of these incidents is not incorporated in the JP timings. Transport Direct is unique in UK in that you can:

- Compare public transport options with a car route to find a way of travelling which best suits your needs.
- Obtain a car route that accounts for predicted traffic levels at different times of the day so you can make informed decisions about when to travel.
- Get an estimate of the cost of a car journey.
- Use PDAs and mobile phones using the latest browser technology (WAP2.0) over a GPRS or a 3G connection to find out departure and arrival times for railway stations throughout Britain and for some bus or coach stops.
- Calculate CO2 emissions for a car or public transport for a specified journey.

Transport Direct works together with both public and private travel operators and local/national government. Transport Direct is operated by a consortium, led by Atos Origin – an international information technology (IT) services company that leads a consortium to design, build and operate the Transport Direct portal. The non-profit service is funded by the UK Dept. for Transport, the Welsh Assembly and the Scottish Government. The Highways Agency, Traffic Wales, Transport Scotland and the rail, coach and bus operators provide information to Transport Direct either directly or through our partners, “Traveline”.
Figure 5 simulates how the mobile version works as it would look on a PDA. Key priorities for further development: improvements to Rail journey planning and mixing a car journey with public transport so you can plan a ‘Drive and Ride’ journey more easily.

4.8. **UK: Traveline Scotland**

[www.travelinescotland.com](http://www.travelinescotland.com)

Traveline Scotland is a multi-mode – bus/coach, rail, ferry, air and private car – journey planner. The information provided is in English which includes routes, schedules, fares and walking time within local / regional and national geographic coverage. The displayed information includes route diagram, tabular form and map. The itineraries generated by the JP comprise of minimum en-route time and minimum transfers time. Other modes provided for include metro, underground bike and walking. Traveline also provides a telephone service 24 hours a day, 7 days a week. Calls cost 10p per minute from BT Landlines. Cost from mobiles or other providers may vary. Traveline Scotland is a partnership between Transport Operators, Local Authorities and Transport Scotland who contribute funds, information and expertise towards its day to day running. Start up and development funding was provided by the Scottish Executive. Traveline Scotland is one of eleven partnerships across the UK which, together, deliver the National Traveline Service. This website is owned, hosted and maintained by Trapeze Group (UK) (Trapeze) and operates using Maps In Action® and IPTISnet [1] technology.
Texting an 8-digit bus stop reference code to the txt2traveline number 0777 608 2 608 will return the departure times of the next few buses from your chosen stop. You can customise your message to allow you to pick a destination, a specific bus service, time period or date. The service is automated and operates 24 hours-a-day, every day. Bus stop reference codes are unique, so information received relates only to one specific bus stop. The following steps show how to text txt2traveline:

- For next departures - Text the bus stop code, e.g. 34398765 to 0777 608 2 608 to get the times of the next buses from your chosen stop.
- For next departures on a specific route - Text the bus stop code followed by an exclamation mark and then the bus service number, e.g. 34398765!x26 to 0777 608 2 608
- For next departures to a specific destination* - Text the bus stop code followed by a dot and then the destination village/town name, e.g. 34398765.anstruther to 0777 608 2 608
- For next departures to a specific destination on a specific route* - Text the bus stop code followed by a dot, the destination village/town name, an exclamation mark and bus service number, e.g. 34398765.anstruther!x26
- For departures after a specific time, on a specific date of the current month - Text the bus stop code followed by a question mark, the 24 hour clock time and the date, e.g. 34398765?170009 to 0777 608 2 608

*The destination must be reachable from your chosen stop by a direct bus service.

At present txt2traveline cannot give details of connecting services.

The message sent by the end user is charged at your normal network provider charge. The returned message from txt2traveline costs 25p. txt2traveline runs on the Journey Text system developed by Journey Plan Ltd.

**4.9. Finland: Public Transport JP by Helsinki Metropolitan Area Council (YTV) YTV Reittiopas**

[http://www.ytv.fi/eng](http://www.ytv.fi/eng)

Information is provided in Finnish, English and Swedish. Real-time information is not available at present but is planned to be introduced. National funding is from national development programmes with regional funding from the regional authorities. The JP is owned and data managed by regional authorities YTV ("powered by Logica"). Data are updated when needed. Key priorities for further development: Dynamic data should be integrated. All modes should be included (also demand responsive transport).

**4.10. Finland: Public Transport JP by Tampere City Transport REPA Reittiopas**

Information is provided in Finnish and English. Real-time information is not available at present but is planned to be introduced. National funding is from national development programmes with regional funding from the regional authorities. The JP is owned and data managed by the Tampere regional authority ("powered by Logica"). Data are updated when needed. Key priorities for further development: Dynamic data should be integrated. All modes should be included (also demand responsive transport).

4.11. **Finland: Oulu Region Public Transport Journey Planner Linjakas**

http://www.linjakas.fi/lang/en

Information is provided in Finnish and English. Real-time information not available at present but is planned to be introduced. National funding is from national development programmes, regional funding is from the regional authorities. The JP is owned and data managed by the Oulu regional authority ("powered by Logica"). Data are updated when needed. Key priorities for further development: Dynamic data should be integrated. All modes should be included (also demand responsive transport).

4.12. **Finland: Journey.fi route planner**

http://www.journey.fi

Journey.fi is a multi-mode journey planner. Information is provided in Finnish, English and Swedish. Air traffic will be incorporated in the near future. Information about fares is available for trains. Searched routes and chosen locations can be stored and the search results updated (cookie data). Different point of interest information (e.g. accommodation services, hospitals and health services, restaurants and cafés, transportation and parking) is available free of charge. Buying of train tickets is possible (through a link to VR Group website).

VR Group is one of the financiers and Destia Ltd participates to the funding through maintenance and development costs. Eniro Ltd. disburses for the right to use Journey.fi service in its telephone service. The JP is owned and data managed by Destia Ltd.

Difficulties encountered include unwillingness of some transport operators to provide data with reasonable compensation. The Technical Research Centre of Finland (VTT) has completed an evaluation about the impacts of Journey.fi journey planner service. The documentation is available (in Finnish, English abstract) on the VTT website.

Key priorities for further development: Improvement of scope and quality of the data is the main development aspect for Journey.fi service, other key priorities are use of real-time data (e.g. delay information) and storage and exploitation of history
data in personal taxation (e.g. need to use private car for commuting). Further
development possibilities of ferry, private car and fare data are investigated.
Journey.fi journey planner will be used in city planning as well as in defining
necessary density of public transport.

4.13. Germany: The Intermodal Journey Planner (IJP) by
Metz DV Munich

Information is provided in German, English, French and Italian. Demand Responsive
Transport (DRT) is included by trip-related notes. In the future a central notification
procedure for these trips will be implemented. The system should then be able to
transmit the notification to the responsible transport operator. Other detailed
information provided to the user includes: Detailed fare calculation; Indoor-routing
within transfer points; Points of Interest; Barrier-free routing. Geographical coverage
is the Greater Munich Area. Maps are based on NAVTEQ-data. Real-time information
is supported by EFA and has already been implemented for a certain period of time.
Due to new infrastructures of various transport operators real-time information is not
incorporated at the moment. The future planning has the incorporation of real-time
information on its agenda. Criteria used to calculate itineraries: EFA generates
automatically the fastest connections. Specifications (transfers, walking speed,
exclusion of means of transport, barrier-free routing etc.) can be personalised by the
user. Any customer can create a personal user profile which allows defining and
recording certain points and connections. When querying information from this
profile the latest updated data are considered which means that the user is up to
date with the current timetable. EFA is available for mobile devices like mobile
phones, WAP, SMS and PDA. There is no “alert” facility while the traveller is en-route.
There is no charge for using EFA. Anyone can use it for free.

Important points of (tourist) interest (e.g. council offices, schools, public
organisations, sights, museums, public baths, cinemas etc.) are included in the JP
and are updated continuously. Dynamic travel information is provided based on a
Content Management System. Latest information on blocked routes and route
diversions can be given as route-, trip-, and direction-related. Individual routes can
be selected. EFA incorporates these features and provides alternative routes in
addition to notes showing restrictions of normal service.

Up to the year 2000 the MVV was co-owner of the EFA. From 2000 onwards the MVV
is the licensed party of the EFA; the owner of the system is Mentz DV, München. The
MVV is in charge of data administration and lay-out; Mentz DV is in charge of
program maintenance and support. Data are updated at least twice per week
(regular updates) – if necessary more often. A data terminal existed for personal
internet access up to 2002. Due to EFA-mobile services and increased use of mobile
phones this terminal is no longer necessary. The JP has been evaluated twice –
whenever basic changes had been realised. Currently a new version of the JP is
tested by market research. This new version contains many new features like indoor
routing, interactive maps, and only one user data field.
Key priorities for further development: The JP is in continuous development. Topics: real-time-information, dynamic creation of network route maps, stop indexes, location maps, GPS-routing for mobile devices. Furthermore many small features are integrated continuously in the JP. Journey planners are subject to continuous changes referring to technology and requirements of the user.

### 4.14. Denmark: Rejseplanen.dk

[www.rejseplane.dk](http://www.rejseplane.dk) Denmark  
(office location: Dampfærgevej 22, PO Box 2593, 2100 Copenhagen)

Information is provided in Danish, German and English. Other information provided to the user includes transport mode, track, remarks to journey etc. Real-time information is not currently incorporated but this is under implementation. Waiting time between transfers is also used as a criterion in calculating itineraries. Itineraries can be stored by e-mail (pdf), sent as an SMS or saved for a calendar (iCalendar format). Although there is no alert facility to support the traveller while en-route this is planned as part of the implementation of real-time. The main service (regarding retail) is the possibility to buy the ticket on-line (by direct referral to for instance DSB on-line shop). Apart from that there are a number of extra services available which are all free of charge and not with commercial focus. These include;

- Microsites (small JP versions for integration on third party websites)
- Station board tickers (web-based live station boards with next departures from specific stop / station for personal integration into website or personalized web pages such as iGoogle, Live etc.)
- Mobile JP which is enhanced for mobile devices (mobil.rejseplanen.dk)
- Intelligent links (with pre-filled input fields to help users find best travel plan)
- IVR solution (available through PTA call centres)
- Touch screens (special rejseplan solution)
- Station boards for large screens (solution for displaying station boards on stations, stop, shopping malls etc.)

The only service which Rejseplanen charges money for (to the end users) is the SMS which is charged 1 DKK + normal SMS charge (approx. 0.25 DKK). At the moment the main dynamic travel information is abruption information which is provided by the PTAs. It is possible to book a ticket for the part of the journey which has on-line booking (DSB and a few bus companies) this is possible.

The JP is funded by all major PTAs in Denmark (DSB, Arriva, Movia, Metro, Fynbus, NT, Sydtrafik, Miftrafik, BAT, Abildskou, Netbus) – the last two of these provide private funds. The owners of the JP are DSB, Movia, Fynbus, NT, Sydtrafik, Miftrafik, BAT. Data are updated weekly in terms of plan data, daily in terms of abruption information. Rejseplanen A/S are responsible for overall data management.

No particular difficulties are experienced besides the normal difficulties of updating and maintaining large quantities of data from many different sources. Regular
evaluation of Rejseplanen has been carried out by user surveys, user groups and expert evaluation. However these evaluations are available only in Danish.

Key priorities for future development of JPs in next 5 years - The main priority is the real-time implementation since this is central for the development of more personalized services which will be the core focus in the future for Rejseplanen. The possibility to provide personalized information before, during and after the journey will give the customer an added value which will bring more people into public transportation.

Rejseplanen (under development) - Denmark www.rejseplanen.dk
(under development – not expected to go live until 2009)

The JP is at national coverage with multi-modal bus, train, ferry, bike and private car. Demand Responsive Transport is under development in the traditional travel planner and will hopefully be available early 2008.

Routes, schedules, Fares and walking times will be provided to the user. Route diagrams, tables and map-based information are intended to be displayed to users. Information will be provided in Danish, English and German. An interesting feature is the environmental impact which will be shown to users but will not be part of the criteria used to calculate the itinerary. The main source of funding and ownership will be combination of Rejseplanen and The Danish Road Authority. Key priorities will be to connect to the users where they are and in the situation where they need to use it (basically to be mobile); on mobile phone or car navigation etc.

### 4.15. Greece: ENOSIS Urban Journey Planner

Information is provided in Greek (English translation is in progress). As well as bus the JP incorporates information on Metro, Tram and Trolley Bus. Lexicographic ordering is used in order to determine the optimum itinerary using all the criteria simultaneously. Figure 6 shows the web portal of ENOSIS JP and Figure 7 shows the airport and seaport information kiosk portal. Latest departure time or earliest arrival time can be specified. Single mode choice option is available. The information provided includes:

- Real-time information about departures – arrivals from/towards the Athens International Airport from the airports of Heraklion, Santorini, Thessaloniki, Mykonos, and Rhodes.
- Real-time information about departures – arrivals of ferries at Heraklion port, as well as inhibited ferry departures.

Real-time information is available via SMS, e-mail (according to the user’s profile) about delays or cancellations of routes.
ENOSIS Applications

✓ search for an urban trip in the region of Attica (select "from", "to", "date" and "departure or arrival time")
✓ search for an interurban trip (select "from", "to" and "date")
✓ in case interurban trip requires an urban transportation match routes
✓ user can subscribe to the system to get personalised information via SMS

Figure 6. ENOSIS JP Application on a web portal

ENOSIS Applications

Two kiosks have been installed in Port of Heraklion and Airport of Athens
✓ search for an interurban trip
✓ search for an urban trip in the region of Attica
✓ search for a trip with interurban buses in Crete
✓ general information about Port of Heraklion or Airport of Athens

Two displays have been placed in Port of Heraklion
✓ daily present departure and arrival timetables
destination (origin) port, estimated time of departure (arrival), shipping company name and vessel name, information message (e.g. delay, boarding etc.) and departure (arrival) dock

Figure 7. ENOSIS JP Application on airport and sea port portal

On-demand service: When selecting a journey the user can select to receive scheduled information messages (SMS/E-mail) concerning the selected journey (journey reminders, boarding instructions, scheduled departure/arrival time, next itinerary of the journey).

The JP is owned by the General Secretariat for Research and Development, Greek Ministry of Development. The urban public transportation network data are provided by the Organization of the Athens Urban Transport System (OASA) i.e. timetables, stops, and travel times. FORTHnet are responsible for overall data management. Formal evaluation has been made within the scope of the R&D project ENOSIS. Documentation is available in Greek. Evaluation was technical, social and economic. Moreover, the project has been presented to key tourism professionals who have
expressed their interest towards it. Evaluation detailed in Zografos et al. (2008). The architecture design of the ENOSIS JP can be seen in Figure 8 below.

**Figure 8. Architecture and travel cycle design for ENOSIS JP**

Key priorities for future development of JPs in the next 5 years:
- Instructions to guide the travellers during mode interchanges (preferred exit / entrance and how to find it)
- Instructions on which platform or station to stand in order to get on the vehicle going on the right direction.
- Real-time travel time updates.

Delivering reservation and tickets as easy as possible, on A4 paper or through the mobile devices

4.16. **Greece: Greek City Journey Planners, e.g. Larisa**  
http://larisa.gnomon.com.gr

There are 10 JPs for 10 Greek cities, for urban bus routing – single mode JP –. They have the same characteristics. The cities are:
- Katerini, http://213.5.45.40/
- Veria, http://85.72.36.237/
- Volos, http://213.5.151.179/
- Lamia
- Kavala
- Iraklio
- Halkida
- Kozani
Serres

Real-time forecast for urban bus arrivals and departures are available. There are no stored itineraries or updated. An alert facility is available via SMS. The SMS provides real-time bus arrival at selected bus stop. The JP may provide dynamic bus arrival time at bus stops. The difficulties in maintaining the data include the frequent changes in service data. In terms of evaluation of the JP there have been audits and testing of the JPs and the routing algorithm where the evaluation was technical.

Key priorities for the further development of single mode JPs over the next 5 years is the development of dynamic routing.

4.17. Greece: Infotrip, Myroute Journey Planner
http://www.myroute.gr

This multi-modal planner includes the walking mode. Real-time information about transport events (car accidents, road works in progress etc) is available. At the moment the JP does not take into account real time traffic information. The next version (June 2008) will include dynamic car routing as part of the intermodal routing. Figure 9 shows the web portal of the JP.
The criteria for calculating itineraries are the date and time of departure, preferred modes (e.g. car, ferry), maximum waiting time at intermediary terminal. SMS and voice portal are available to provide real-time traffic information and bus arrival time. Other services available to users (e.g. relating to tourism or retail activity) includes tourism & POI DB, Geomarketing with no charge for end user.

There are difficulties maintaining data and lack of data. The routing algorithm used was extensively tested and evaluated in the course of INTELECT R&D Project.

The key priorities for the further development over the next 5 years are the presentation of points of interest along the chosen route and the further development of real-time data acquisition and presentation and also the inclusion of full scale multi-modality and use of real-time data in the JP.

Figure 10 shows the architecture design of Infotrip, Myroute JP.
4.18. **Netherlands: NS (developed by EDS) NS treinplanner**
[http://www.ns.nl](http://www.ns.nl)

NS is a single mode – rail – JP with multi-lingual provision in Dutch and English. The information provided includes routes, schedule, fares and walking time which also incorporates real-time information about delays but without personal storage provided. Delays longer than 30 minutes can be communicated by SMS to travellers en-route where the data are updated as soon as possible. NS is the owner of the JP, the data manager and provides funding for the JP.

4.19. **Netherlands: Schiphol vlucht reisplanner (provided by Falkplan)**
[http://schiphol.nl/_van_naar_schiphol/VluchtReisplanner.jsp](http://schiphol.nl/_van_naar_schiphol/VluchtReisplanner.jsp)

Information is provided in Dutch and English. No personal storage provided for storing or updating itineraries. Weather forecast information is available to users. Schipol is the owner of the JP, the data manager and provides funding for the JP.
Key priorities for future development of JPs in next 5 years - Provide up-to-date, real-time and reliable information to travelers on route.

4.20. Netherlands: 9292ov (provided by REISinformatiegroep Reisplanner 9292)
http://routeplanner.9292ov.nl/

Information is provided in Dutch and English. Real-time congestion information and delays for public transport are provided. Dynamic congestion and delay information is provided to travellers en-route by SMS. REISinformatiegroep owns the JP.

Key priorities for future development of JPs in next 5 years - Provide up-to-date, real-time and reliable information to travellers on route

4.21. Spain: Guisa Campsa
www.guisacampa.com

Guisa Campsa is a single mode – private car – JP with a multi-lingual provision: Spanish, English and Portuguese. The information provided includes routes and fares within local / regional, national and international geographic coverage. The fares provided are the toll rates, the vehicle consumption or the combination of both of them, according to the criteria established by the user.

The real-time information includes road status information on a national basis, allowing the choice of the type of incident the user is interested in: traffic cones, weather information, civil works, traffic congestions and mountain passes.

The criteria used to calculate itineraries include:
1. Shortest route
2. Using highways
3. Using customised speed routes: allows selection of the type of routes the driver wants to use depending on the maximum speed allowed: highways, international route or motorways, first order route, second order route, local route. There are a set of pre-established speeds assigned to each type of route that correspond to the speed allowed by the General Traffic Directorate. The user is asked to respect these limits not introducing higher values as a system criteria.
4. Avoid tolls
5. Avoid traffic incidents (only available for Spain)
6. Type of map – map or route diagram
7. Type of vehicle – car, light industrial vehicle and heavy industrial vehicle
8. Weather forecast – specifying the day the information is requested for
10. It is also possible to select 3 municipalities the user would like to pass when performing the itinerary.

The above mentioned criteria 1, 2, 3 and the minimum en-route time can not be combined, the user has to choose one criteria or another. These criteria can be combined with the rest: 4-10.

Itineraries can be stored and/or updated: when the trip planner is accessed through a mobile device or when accessing it through the website but entering in the option “Guisa Campsa in my mobile phone”. To use this facility it is necessary to be registered in repsolypf.com, the company Guisa Campsa belongs to. You can register if you are customer of Repsol – for example if you have oil heating – or if you buy the Guisa Campsa – then you are provided with a code to register in the website. This means that this service is not accessible by everybody. The service includes storing of information on routes, maps, petrol stations, restaurants and hotels and this information is then available through the website or through the mobile phone service.

Other services includes a section on tourism information including articles, tourist routes, information on municipalities, monuments, festivities, natural environments, golf course, beaches, sky resorts, harbor ports, restaurants and camping, special routes like the Camino de Santiago or the Don Quijote Route and Regional Tourism information. The company itself provides all the information on routes and itineraries. The infrastructure providers and the Government provide all the information related to route status incidents and tourism operators provides all the tourism-related information.

4.22. Spain: Transport Consortium of Madrid, Community of Madrid

http://www.ctm-madrid.es/

Transport Consortium of Madrid (CTM) is a multi-modal – metro, tramway, train, urban and interurban bus – JP which is provided in English and Spanish. It is possible to select only one mode or combination of all. Fares are not provided for a specific trip. In the website there is information about the fares of each one of the transport modes, including single trips, travel cards, discounts, etc.

Information provided can not be stored. Part of an itinerary can be updated / modified when the user is using the system and wants, for example to modify the destination point with the same origin point. There is no alert facility but there is a section in the website that updates information on the incidents in the public transport network. The information is updated each time new information affecting the trip planner is available.

The JP is publicly funded but there is private collaboration for providing the transport contents since there are private transport companies running the inter-urban bus routes.
The data are provided by two main bodies: the Ministry of Industry, Transport and Tourism – who provide the railway information – the Transport Consortium of Madrid, which includes the Community of Madrid and the municipalities adhered to it – providing information on the metro, the tramway, public bus lines and private bus lines. There is a public-private co-operation when providing the data to obtain a system as complete as possible.

CTM was part of the FP5 WH@M Project (see Errore. L'origine riferimento non è stata trovata.) and this JP was used as a building block of the trip planner developed in WH@M – completing the information to provided real-time and tourism information. This system was evaluated by a number of end users in Madrid and the results of this evaluation were successful.

4.23. China: Hangzhou Bus

Hangzhou Public Transport Corporation

http://www.hzbus.com.cn/index.jsp

Hangzhou Bus is a single mode – bus / coach – JP which is provided in Chinese. The information provided includes routes and schedules within local / regional geographic coverage. No real-time information is available but it allows someone to search routes based on tourism attraction locations in a tabular format display.

Hangzhou Bus Company own the JP and are responsible for data management. Key priorities for the next 5 years are to display map-based information to the users.


http://www.hzcb.gov.cn/

Hangzhou transport is a multi-mode – bus / coach, rail and air JP which is provided in Chinese. The information provided includes routes and schedule in the form of tabular display within national geographic coverage.

Hangzhou Transport Bureau own the JP and are responsible for data management. Key priorities are to add fare information to the system.

4.25. Japan: Yahoo, Route Selection

http://transit.yahoo.co.jp/

Yahoo Route Selection is a multi-modal – bus / coach, rail and private car JP which is provided in Japanese. The JP shows all kind of route candidates with each time, cost, and number of transfer(s) so that users can choose their preferable route according to their situation within a national geographic coverage. It uses on-line real-time information according to the actual operation status of a means of transportation.
Key priorities for the next 5 years are to develop railway JP.
5. CONCLUSIONS

This document is prepared to support Deliverable 2.1 for WISETRIP project report of analysis of requirements. Three activities have been conducted to produce this document:

- Literature Review,
- Review of previous/existing EU project of direct interest to WISETRIP and
- International Survey of experience with internet based journey planners.

The objective of WISETRIP Deliverable 2.1 document is to identify passenger information and journey planning system that best fit to the user’s needs. It is essential to specify the major services that should be provided by the WISETRIP system based on the user needs before commencing the design of WISETRIP, taking into account the prevailing technological, legal and institutional constraints which are relevant to the proposed system.

In Chapter 2, the literature revealed some of the fundamental user requirements for developing a good journey planning system. This includes the function of multi-modal transport information and delivery of real-time information to mobile phones and cross-border international. The rising expectation from the customer point of view is for instant information which in turn requires increasing system complexity.

In Chapter 3, the review of previous/existing EU project revealed that there are two existing projects which are having a similar objective with WISETRIP: EU Spirit and ITISS. Whilst the IM@GINE-IT and the eMOTION projects have shown the relevant direction for WISTRIPE to develop a functional analysis and architecture design of the integrated journey planning system, the EU Spirit and the ITISS projects have shown that the experiences of cross-border international journey planning system can be challenging. Some of the challenges that WISETRIP can learn from include (Source: ITISS Newsletter vol. 5, 2007):

- A user community that was spread across a number of member EU countries,
- A user community that had differing cultural aspirations that were required to be incorporated into the application,
- A ‘virtual’ development team that was geographically dispersed, and
- A development team that was not ‘full-time’ on the project.

A number of key protocols were adopted by the ITISS development team which ensured the successful delivery, these include (Source: ITISS Newsletter vol. 5, 2007):

- A clear, structured, control process to capture business requirement,
- New technology solutions utilised to assist and improve communication,
- Extensive use of prototyping by the ITISS development team, and
- Where traditional ‘face to face’ meetings were undertaken they were focussed on agreeing next phases of development and ensuring that all parties were meeting their requirements.
In Chapter 4, the survey of internet-based journey planners (JP) shows variation of different services offered by JP across different countries occurs. This issue can give rise to the problem of standardisation of data as experienced in the ITISS project (as described in Chapter 3). Furthermore, the expansion of cross border continent as proposed by WISETRIPE – with the involvement of the Chinese partners – and this will make language interface and its character a challenging task to integrate in the journey planning system.

For the business model requirement, WISETRIP can learn from the ITISS market research which has shown that different countries have different preferences. However, despite the challenges faced during the project, feedback on the ITISS portal is generally positive (ITISS Newsletter vol.5, 2007).
6. REFERENCES


IM@GINE-IT (2004) Use Cases and user / vehicle profile requirements. *Deliverable D1.1*. IM@GINE-IT Consortium, IST-508008.


7. ANNEX I: INTERNET-BASED JOURNEY PLANNERS: AN INTERNATIONAL SURVEY OF EXPERIENCE

INTRODUCTION

This survey forms part of an international review of the state-of-the-art in Internet-based Journey Planners which is being undertaken as part of the FP7 WISETRIP project (“Wide Scale network of E-systems for Multimodal Journey Planning and Delivery of Trip Intelligent Personalised data” (Project No 213233).

Part 1 relates to Single Mode Journey Planners and Part 2 relates to Multi-Modal Journey Planners - please complete which ever is relevant to your case. All respondents should complete Part 3.

Part 1: Single Mode Journey Planners

Which single mode Journey Planner(s) do you consider constitute current best practice?

For each nominated Journey Planner (JP) please complete the following questions:

Name, location and URL of the JP
## Content

### What information is provided to the user?

<table>
<thead>
<tr>
<th>Information</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Routes</td>
<td></td>
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<tr>
<td>Schedules</td>
<td></td>
</tr>
<tr>
<td>Fares</td>
<td></td>
</tr>
<tr>
<td>Walking times</td>
<td></td>
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<tr>
<td>Other (please specify)</td>
<td></td>
</tr>
</tbody>
</table>

### What is the geographical coverage of the JP?

<table>
<thead>
<tr>
<th>Coverage</th>
<th></th>
</tr>
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<tbody>
<tr>
<td>Local</td>
<td></td>
</tr>
<tr>
<td>National</td>
<td></td>
</tr>
<tr>
<td>International</td>
<td></td>
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</tbody>
</table>

### Does the JP incorporate any real-time information? (please specify)

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### How is information displayed to users?

<table>
<thead>
<tr>
<th>Display Method</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Route diagram</td>
<td></td>
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<tr>
<td>Tabular form</td>
<td></td>
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<tr>
<td>Map-based</td>
<td></td>
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<tr>
<td>Use of Google Earth (or equivalent)</td>
<td>☐</td>
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<tr>
<td>Combination of the above (please give details)</td>
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</table>

What language(s) is information provided in?

<table>
<thead>
<tr>
<th>What criteria are used to calculate itineraries?</th>
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<tbody>
<tr>
<td>Minimum en-route time</td>
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<tr>
<td>Minimum number of transfers</td>
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<tr>
<td>Minimum walking time</td>
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<tr>
<td>Minimum cost</td>
</tr>
<tr>
<td>Other (please specify)</td>
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</tbody>
</table>

| Combination of the above (please give details) |

Can itineraries be stored and / or updated?

Is there an “alert” facility / does the JP provide any support while the traveler is en-route? (please specify type of information provided)
Are any other services available to users (e.g. relating to tourism or retail activity)?
Is there any charge?

Does the journey planner provide dynamic travel information? If yes, please specify the categories of dynamic information available from the Journey Planner.

Is it possible for the user to book his/her ticket(s) through the Journey Planner internet application (if any)?

Institutional and Legal Issues

What is the main source of funding for the JP?

EU

11/09/2009 @ The WISETRIP Consortium
TPT-213233-WISETRIP-D2.1a: Integration of the Results from Relevant EU Projects

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<tbody>
<tr>
<td>National</td>
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</tr>
<tr>
<td>Regional</td>
<td></td>
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<tr>
<td>Local</td>
<td></td>
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<tr>
<td>Combination of the above (please give details)</td>
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</table>

Are there any private sources of funding?

Who is the owner of the JP?

Organisational Issues

Who maintains the JP?

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<tr>
<td>In-house</td>
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<tr>
<td>Consultants</td>
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<tr>
<td>Other (please specify)</td>
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</table>

How often is the data updated?

<p>| | |</p>
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<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Daily</td>
<td></td>
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</table>
Who are the data providers?

<table>
<thead>
<tr>
<th>Option</th>
<th>Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport Operators</td>
<td>□</td>
</tr>
<tr>
<td>Infrastructure providers</td>
<td>□</td>
</tr>
<tr>
<td>Government</td>
<td>□</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
</tr>
<tr>
<td>Combination of the above (please give details)</td>
<td>□</td>
</tr>
</tbody>
</table>

Who is responsible for overall data management?


Are there any particular difficulties in maintaining the data?


Apart from personal Internet access what other media are available for accessing the information?

<table>
<thead>
<tr>
<th>Media</th>
<th>Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMS</td>
<td>□</td>
</tr>
</tbody>
</table>
Are you aware of any evaluation of the JP already completed (e.g. technical, social, economic)? Please supply details and any available documentation.

What do you consider to be the key priorities for the further development of single mode JPs over the next 5 years?
Part 2: Multi-Modal Journey Planners

Which multi-modal Journey Planner(s) do you consider constitute current best practice?

For each nominated Journey Planner (JP) please complete the following questions:

Name, location and URL of the JP

Content

Which modes are incorporated?

<table>
<thead>
<tr>
<th>Mode</th>
<th>Included</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus and coach</td>
<td></td>
</tr>
<tr>
<td>Rail</td>
<td></td>
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<tr>
<td>Ferry</td>
<td></td>
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<tr>
<td>Air</td>
<td></td>
</tr>
<tr>
<td>Private car</td>
<td></td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
</tr>
</tbody>
</table>

Is Demand Responsive Transport (DRT) included? Please give details of its representation.
What information is provided to the user?

<table>
<thead>
<tr>
<th>Information</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Routes</td>
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<tr>
<td>Fares</td>
<td></td>
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<tr>
<td>Walking times</td>
<td></td>
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What is the geographical coverage of the JP?

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<tr>
<td>National</td>
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<tr>
<td>International</td>
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Does the JP incorporate any real-time information? (please specify)
How is information displayed to users?

<table>
<thead>
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<th>Option</th>
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<tbody>
<tr>
<td>Route diagram</td>
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<tr>
<td>Tabular form</td>
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<tr>
<td>Map-based</td>
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<tr>
<td>Use of Google Earth (or equivalent)</td>
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<tr>
<td>Combination of the above (please give details)</td>
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What language(s) is information provided in?

What criteria are used to calculate itineraries?

<table>
<thead>
<tr>
<th>Criteria</th>
<th>☐</th>
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<tbody>
<tr>
<td>Minimum en-route time</td>
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<tr>
<td>Minimum number of transfers</td>
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<tr>
<td>Minimum walking time</td>
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<td>Minimum cost</td>
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<td>Combination of the above (please give details)</td>
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</table>
Can itineraries be stored and/or updated?

Is there an “alert” facility / does the JP provide any support while the traveler is en-route? (please specify type of information provided)

Are any other services available to users (e.g. relating to tourism or retail activity)? Is there any charge?

Does the journey planner provide dynamic travel information? If yes, please specify the categories of dynamic information available from the Journey Planner.

Is it possible for the user to book his/her ticket(s) through the Journey Planner internet application (if any)?
Institutional and Legal Issues

What is the main source of funding for the JP?

- EU
- National
- Regional
- Local
- Combination of the above (please give details)

Are there any private sources of funding?

Who is the owner of the JP?

Organisational Issues

Who maintains the JP?
- In-house
- Consultants
Other (please specify)

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<th>How often is the data updated?</th>
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<tr>
<th>Who are the data providers?</th>
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<td>Infrastructure providers</td>
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<tr>
<td>Government</td>
</tr>
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<td>Other (please specify)</td>
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</table>

| Combination of the above (please give details) |

Who is responsible for overall data management?

Are there any particular difficulties in maintaining the data?
Apart from personal Internet access what other media are available for accessing the information?

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<thead>
<tr>
<th>Media</th>
<th>Selection</th>
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<td>Dedicated Kiosk / Terminal</td>
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<td>Telephone</td>
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<td>Other (please specify)</td>
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</table>

Are you aware of any evaluation of the JP already completed (e.g. technical, social, economic)? Please supply details and any available documentation.

What do you consider to be the key priorities for the further development of single mode JPs over the next 5 years?
Part 3: Next steps

Are you willing to assist in a more detailed investigation of JP functionality and to exchange information and experience with the WISETRIP consortium?

Please supply name, position and organisation of person completing the questionnaire.

THANK-YOU FOR YOUR CO-OPERATION. COMPLETED SURVEYS AND ANY SUPPORTING DOCUMENTATION SHOULD BE RETURNED TO PROF JOHN NELSON, THE CENTRE FOR TRANSPORT RESEARCH, UNIVERSITY OF ABERDEEN, e-mail: j.d.nelson@abdn.ac.uk by 31st March 2008.
8. ANNEX II: SUMMARY OF INTERNET-BASED JOURNEY PLANNERS SURVEY RESPONSES

4. Italy "Busbussola" - Public Transport JP of ATAF Spa (Florence Public Transport Company)  www.ataf.net
5. Italy "TIMETABLES SEARCH ENGINE!" – Public Transport JP of Autolinee F.Lli Lazzi Spa (urban and extraurban public transport operator in different areas of the Tuscany Region) http://www.lazzi.it/eng/activenews.asp
7. Italy “Mobiliter” - Emilia Romagna http://www.mobiliter.eu/
8. UK Megabus www.megabus.com
9. UK The Trainline www.thetrainline.com
10. UK Transport Direct www.transportdirect.info
11. UK Traveline Scotland www.travelinescotland.com
12. Finland Public Transport Journey Planner by Helsinki Metropolitan Area Council (YTV) - http://www.ytv.fi/eng YTV Reittiopas
15. Finland Journey.fi route planner : www.journey.fi
16. Germany The Intermodal Journey Planner (IJP) by Mentz DV Munich
17. Denmark Rejseplanen.dk (www.rejseplane.dk) Denmark (office location: Dampfærgevej 22, PO Box 2593, 2100 Copenhagen)
18. Greece ENOSIS Urban Journey Planner
20. Greece Infortrip, Myroute Journey Planner www.myroute.gr
21. Netherlands NS (developed by EDS) NS treinplanner www.ns.nl
22. Netherlands Schiphol vlucht reisplanner (provided by Falkplan) http://schiphol.nl/_van_naar_schiphol/VluchtReisplanner.jsp
23. Netherlands 9292ov (provided by REISinformatiegroep Reisplanner 9292 http://routeplanner.9292ov.nl/
24. Spain Guia Campsa, www/guiacampsa.com
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**Mode type covered**

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**Info provided to user**

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**Geographic Coverage**

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<td>Map based</td>
<td></td>
</tr>
<tr>
<td>Google Earth</td>
<td></td>
</tr>
</tbody>
</table>

Criteria to calculate itineraries

- Min en-route time
- Min transfers
- Min walk time
- Min cost
- Other

Other content features

- Real Time Information

11/09/2009 @ The WISETРИP Consortium
<table>
<thead>
<tr>
<th>Service</th>
<th>Italy</th>
<th>UK</th>
<th>Finland</th>
<th>Germany</th>
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<th>Greece</th>
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<tbody>
<tr>
<td>Itinerary store/update</td>
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<tr>
<td>‘Alert’ facility</td>
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<td>Dynamic travel time</td>
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<tr>
<td>Ticket booking</td>
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### Funding

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<tr>
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<td>National</td>
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<tr>
<td>Local</td>
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<tr>
<td>Combination</td>
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### Maintenance

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<th>Source</th>
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<tbody>
<tr>
<td>In house</td>
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<tr>
<td>Consultants</td>
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### Data updates

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<td>Daily</td>
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<td>Other</td>
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### Data providers

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<td>Transport operators</td>
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### Other media for accessing info

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<td>kiosk/terminal</td>
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### Evaluation?

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<td>Other</td>
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</table>
9. ANNEX III: Surveying functional & technological issues for Journey Planners to integrate into WISETRIP platform

INTRODUCTION

This survey forms part of our investigation into technological and functional matters for the integration of participating Journey Planners into the WISETRIP system - or even for other (extra-WISETRIP) Journey Planners who have shown interest to interact with the WISETRIP project and could join the WISETRIP platform.

The result of this survey is contributing to

- Task 2.1, providing contribution towards the consideration of technological issues and possible identification of constraints and
- Task 2.3, contributing to the analysis of the problems to be resolved in order to integrate participating Journey Planners into WISETRIP, indicating also possible solutions

The survey will not solely rely on the written response to this document but will also conduct interviews with Journey Planner contacts for further analysis of the various items, as well as analyse your answers already received to the first survey made.
Part A: About functionality

PLEASE WRITE YOUR ANSWERS IN THE BOXES BELOW EACH QUESTION

- **USE CASE 1: Alerting**
  Our USER has selected an international trip from loc.A to loc.B which involves the following path:
  - H1: Loc.A – bus (suburban route) – Loc.X
  - H2: Loc.X – air (international route) – Loc.Y
  - H3: Loc.Y – walk – Loc.Y.train station
  - H4: Loc.Y.train station – railway – Loc.B
  H1 sourced from JP1
  H2 defined by the user
  H4 sourced from JP2
  The railway trip from Loc.Y to Loc.B has been cancelled. This happened sometime before the trip from Loc.A started or even while on trip from Loc.A to Loc.Y. Next trip scheduled is one and a half hours later. USER receives an alert message into his mobile notifying him for the change and the new arrangement that is proposed.

Assume your JP is JP2. Can your JP provide an alert about a cancellation or modification of a trip? i.e. a modification of a trip might be related to a change of the vessel, train number or else. Do you plan to develop such functionality?

Do you plan to provide such or similar functionality in the future? Please explain.

- **USE CASE 2: Regular Update of a specific question**

  Selection means that the user has been presented with various options from WISETRIP user interface but he chose one of them and he has registered his details for this specific trip so that to get informed about it before/after/during the trip path. This is one of the personalized scenarios.
A person residing at area Loc.A is a frequent visitor to place at Loc.B which is 150 kms away. It is intended that WISETRIP can serve this personalised need by enabling the user to register this request and ask for a periodical monitor or alerting of new data. IS there any relevant service of your JP addressing the need of frequent update/monitor of the available solutions?

Do you plan to provide such or similar functionality in the future? Please explain.

**USE CASE 3: Personalisation Case – Dealing with seasonal data that are not available at a specific time**

For example in Greece, islands are highly visited during the summer. However, although people want to arrange their holidays early enough, this is not possible before the ferry/airline schedules are announced. The WISETRIP Journey Planner is expected to register a specific request and keep the user updated as soon as there is an answer for him. Is there a similar requirement in your area/nation? How do you deal with it? Does your system provide a special service for it? When such a hop is encountered (i.e. a user asks in January to move from Helsinki to island of Amorgos for a specific date. The answer is NULL but in two months there will be an available answer) WISETRIP should somehow motivate the user to subscribe the request along with his details for a future answer.

Do you plan to provide such or similar functionality in the future? Please explain.
**USE CASE 4: Real Time Traffic or Incident Information**

Our user is travelling along the route he has already registered through WISETRIP. However he uses his mobile interface to get real-time traffic information for a specific urban hop of his trip. Can your JP provide such information? Can the JP report an incident related to the selected route?

Do you plan to provide such or similar functionality in the future? Please explain.

- Can the Journey Planner take as an input:
  - c. the current position of the user (X,Y coordinates or street address) and
  - d. the current route
and provide more data (incident, traffic, information about stops and terminals)

Do you plan to provide such or similar functionality in the future? Please explain.

- What are the time criteria supported for Journey Planner queries?

<table>
<thead>
<tr>
<th></th>
<th>Exact Departure time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Departure time before X</td>
</tr>
</tbody>
</table>
Please mention combinations of the above that can be applied i.e. 2-3, 1-8 are two possible combinations that could be supported from a certain JP in a specific query

- What are the sorting criteria that can be applied for trip query responses? Can the user select the sorting in advance or is he applying it during the presentation phase? What are the default sorting criteria applied?

- Are there any filtering criteria applied during the calculation of a proposed set of routes i.e. provide only answers with less than N hops, or with no walking, or with cost less than X, or duration less than T. Mention all filters that can be applied during the calculation of a proposed set of routes. Not those that are applied at the user interface level.
• How does the Journey Planner deal with proximity or uncertainty in the following cases?

**Spatial proximity** – a specified location is not within the set of transport network nodes covered. However an answer can be given using a nearby location/node.

**Naming proximity** – the name of the location specified is not exactly the one stored though it refers to the same location (i.e. it is a synonym or there is a spelling differentiation/error such as Thira - Santorini, Helsinki – Elsinki, etc)

**Time proximity** – though the JP for a specified time window does not give an answer or gives a set of answers, there are

---

**Part B: About technology & performance**

**PLEASE WRITE YOUR ANSWERS IN THE BOXES BELOW EACH QUESTION**

• What is the average response time of the system to the most frequent Journey Planner questions?

• What is the maximum response time ever monitored? Can you record when the system does reach such performance limits? Please indicate either type of queries that cause bad response or other conditions (i.e.
system or network load, server congestion or other) that cause unacceptable level of response.

• Can your system interface to other systems so that to
  a. receive queries from external systems such as an other portal (i.e. a voice web interface) or (future) WISETRIP modules and
  b. provide the answers to an other external interface?

• If the above answer is positive, please mention what kind of interface is implemented (Web Services, XML, other)

• Please identify what technologies are implementing the Journey Planner (provide protocols, trademarks, product names etc.)
  - Programming Language/Framework
  - Operating System
  - RDBMS (i.e. Oracle, MySQL, MS SQL, DB2, other)

Part C: About Data

PLEASE WRITE YOUR ANSWERS IN THE BOXES BELOW EACH QUESTION

• Do you follow a specific standard in data representation within
  e. query response
  f. query data
  g. stored data & representation of transport network
  h. real time, traffic & incident information
If yes, please name the standard and where it is used

- Provide a brief analysis on how you represent the transport network, the types of nodes, modes etc.

- Does the network covered by your Journey Planner include one or more international travel network gates? i.e. ports, airports, rail terminals. Please name them and mention whether urban transport links to this node are available through the Journey Planner
CONTACT INFORMATION

Please provide name of persons from the organisation that filled the questionnaire

THANK-YOU FOR YOUR CO-OPERATION. COMPLETED ANSWERS AND ANY SUPPORTING DOCUMENTATION SHOULD BE RETURNED TO VASSILIS SPITADAKIS, e-mail: vspit@forthnet.gr by 13th May 2008. INTERVIEWS MIGHT BE ARRANGED BETWEEN JPs and FORTHNET REPRESENTATIVES IN ORDER TO FACILITATE THE COLLECTION OF THE RESPONSES.
10. ANNEX IV: INSTITUTIONAL & ORGANIZATIONAL ISSUES OF INTERNET-BASED JOURNEY PLANNERS

Integration of International Survey of real experiences

INTRODUCTION

This survey is part of the WISETRIP project’s investigation of the current Internet-based Journey Planners experiences and applications from the institutional and organizational point of view. The results will be integrated in the overall general survey results under the work carried out under the WISETRIP WP2. In particular, this survey relates both to Single Mode and Multi-Modal Journey Planners. Please complete which ever is relevant to your case.

Single Mode or Multi-Modal JP

For each nominated Journey Planner (JP) please complete the following questions:

Name, location and URL of the JP

Institutional and Legal Issues

How did the JP start?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Voluntary</td>
<td>☐</td>
</tr>
<tr>
<td>Mandatory (i.e. commitment in the service contract)</td>
<td>☐</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
</tr>
</tbody>
</table>

Which was the (main) reason for developing JP (e.g. very poor information for travelers in a country/area; policies/strategies to encourage people and tourists to visit a country/area; events that were planned in a country/area and stimulated the local/national Authorities to make the improvement of travelers' information systems one of the priorities for the successful of the events...)?
Please fill your answer and any further details in the box below.
JP Funding:

1. JP Start-up
   a. Who financed the JP start up?

<table>
<thead>
<tr>
<th>Financing Options</th>
<th>Select</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public body/ies including transport operators owned by the public Authorities (public initiative)</td>
<td>☐</td>
</tr>
<tr>
<td>Private body/ies (private initiative)</td>
<td>☐</td>
</tr>
<tr>
<td>Joint PP initiative with Public (EU, Local, National Government) and Private sector (i.e. transport operators not owned by public Authorities, IT providers)</td>
<td>☐</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
</tr>
</tbody>
</table>

How has been the funding carried out? Joint initiative: who decided to finance what?
Please fill your answer and any further details in the box below.

b. In the case of Consortium or Joint co-financing initiative for the project start-up, which is the partners’ contribution?

<table>
<thead>
<tr>
<th>Contribution Options</th>
<th>Select</th>
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</thead>
<tbody>
<tr>
<td>The contribution is equal for each partner</td>
<td>☐</td>
</tr>
<tr>
<td>All partners provide different contributions</td>
<td>☐</td>
</tr>
<tr>
<td>One of the partner provides the greater contribution and the other ones fund in the same percentage</td>
<td>☐</td>
</tr>
<tr>
<td>Main partner contribution is up to 30%</td>
<td>☐</td>
</tr>
<tr>
<td>Main partner contribution is over 50%</td>
<td>☐</td>
</tr>
<tr>
<td>Other (please specify)</td>
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</tr>
</tbody>
</table>

Considering the different partners contribution, how is the process to take strategic decisions about the JP managed?
Please fill your answer and any further details in the box below.
2. Next and future steps:
   a. Who is financing the JP?

<table>
<thead>
<tr>
<th>Option</th>
<th>Checkbox</th>
</tr>
</thead>
<tbody>
<tr>
<td>The same partnership/consortium that has financed the start-up of JP</td>
<td></td>
</tr>
<tr>
<td>A new Consortium of Public bodies</td>
<td></td>
</tr>
<tr>
<td>A new Consortium of Public bodies and Transport Operators</td>
<td></td>
</tr>
<tr>
<td>A new Consortium of Public bodies and IT providers</td>
<td></td>
</tr>
<tr>
<td>A new private partner/consortium</td>
<td></td>
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<tr>
<td>Other (please specify)</td>
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</tbody>
</table>

   In the case of a change of JP partner/partnership funding, please provide the motivations and any further details in the box below.

   b. In the case of a Consortium, who is the leader?

<table>
<thead>
<tr>
<th>Option</th>
<th>Checkbox</th>
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</thead>
<tbody>
<tr>
<td>Public Authority</td>
<td></td>
</tr>
<tr>
<td>Transport operator</td>
<td></td>
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<tr>
<td>Private company</td>
<td></td>
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<tr>
<td>Financial Operator</td>
<td></td>
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<tr>
<td>Other (please specify)</td>
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</tbody>
</table>

   What is the role and the responsibility of the Consortium leader?
   Please fill your answer and any further details in the box below.

Property

What is the relationship between the owner of JP and the Data provision?

<table>
<thead>
<tr>
<th>Option</th>
<th>Checkbox</th>
</tr>
</thead>
<tbody>
<tr>
<td>The owner of JP is not the owner of the Data</td>
<td></td>
</tr>
<tr>
<td>The owner of JP is also the owner of the Data</td>
<td></td>
</tr>
</tbody>
</table>
Other (please specify)

Different properties:

- The Data owner provides a non-exclusive license to the JP owner to publish the data.
- The JP owner has an exclusive license to publish the data.
- The JP owner has an exclusive license to publish the data with some constraints.
- The Data owner is obliged to provide data to the JP owner (i.e. in the field of legal framework, local agreements...).
- Other (please specify)

Please fill any further details about license in the box below.

Organizational issues

**JP Development and Maintenance**

1. **JP Software**

- JP owner has the software copyright (the software has been developed with internal resources-personnel).
- Joint-copyright of the software (the software has been developed by internal resources-personnel together with external ICT firm).
- JP owner has a software Licence use (the software has been developed by external firm).
- Other (please specify)

How was the copyright defined? Which are its main characteristics?
Please fill your answer and any further details in the box below.

2. **Maintenance**
   a. **In-house**
b. **Consultant (Software developed together with external firm)**

- After the *WARRANTY* period. The Maintenance is not included in the supply contract and will be negotiated during the *WARRANTY period.*

- The Maintenance is defined and included in the supply contract

Which are the main interventions and timing of the maintenance process? Which is the maintenance cost in terms of % of the overall JP SW development costs? 
**Please fill your answer and any further details in the box below.**

### Management

What is the relationship between the manager of JP and the Data provider?

- The JP manager is not the Data provider
- The JP manager is also the Data provider
- Other (please specify)

Responsibility

- The Data provider is the responsible for any lack or wrong information displayed on JP
- The Data provider and JP managers are both responsible for any lack or wrong information displayed on JP
- Other (please specify)

**Please fill any further details about responsibility in the box below.**
Please supply name, position and organisation of person completing the questionnaire.

THANK-YOU FOR YOUR CO-OPERATION. COMPLETED SURVEYS SHOULD BE RETURNED TO ATAF TO MS SONIA CERRI AT e-mail: cerri@ataf.fi.it by 14th May 2008.
11. ANNEX V: SUMMARY OF RESPONSES: INSTITUTIONAL & ORGANIZATIONAL ISSUES OF INTERNET-BASED JOURNEY PLANNERS
Integration of International Survey of real experiences

1. **Italy** “Busbussola” - Public Transport JP of ATAF Spa (Florence Public Transport Company) [www.ataf.net](http://www.ataf.net)
2. **Italy** “TIMETABLES SEARCH ENGINE!” – Public Transport JP of Autolinee F.Ili Lazzi Spa (urban and extraurban public transport operator in different areas of the Tuscany Region) [http://www.lazzi.it/eng/activenews.asp](http://www.lazzi.it/eng/activenews.asp)
3. **Italy** “Google Transit” – JP of the overall area in the Province of Florence (Italy) -Google Transit Firenze [http://www.google.com/transit](http://www.google.com/transit)
5. **UK** Megabus [www.megabus.com](http://www.megabus.com)
6. **UK** The Trainline [www.thetrainline.com](http://www.thetrainline.com)
7. **UK** Transport Direct [www.transportdirect.info](http://www.transportdirect.info)
8. **UK** Traveline Scotland [www.travelinescotland.com](http://www.travelinescotland.com)
9. **Finland** Public Transport Journey Planner by Helsinki Metropolitan Area Council (YTV) - [http://www.ytv.fi/eng](http://www.ytv.fi/eng) YTV Reittiopas
12. **Finland** Journey.fi route planner : [www.journey.fi](http://www.journey.fi)
13. **Germany** The Intermodal Journey Planner (IJP) by Mentz DV Munich
14. **Denmark** Rejseplanen.dk ([www.rejseplanen.dk](http://www.rejseplanen.dk)) Denmark (office location: Dampfæergevej 22, PO Box 2593, 2100 Copenhagen)
15. **Greece** ENOSIS Urban Journey Planner
16. **Netherlands** NS (developed by EDS) NS treinplanner [www.ns.nl](http://www.ns.nl)
17. **Netherlands** Schiphol vlucht reisplanner (provided by Falkplan) [http://schiphol.nl/_van_naar_schiphol/VluchtReisplanner.jsp](http://schiphol.nl/_van_naar_schiphol/VluchtReisplanner.jsp)
18. **Netherlands** 9292ov (provided by REISinformatiegroep Reisplanner 9292 [http://routeplanner.9292ov.nl/](http://routeplanner.9292ov.nl/)

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21. **Japan**  Yahoo, Route Selection  [http://transit.yahoo.co.jp/](http://transit.yahoo.co.jp/)

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Data owner provides a non-exclusive license to the JP
JP owner has an exclusive license
JP owner has an exclusive license with some constraints
Data provision is mandatory

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