PROJECT FINAL REPORT

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

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1.1 Executive Summary

WISETRIP project is briefly described through its full title: Wide Scale network of E-systems for Multimodal Journey Planning and Delivery of Trip Intelligent Personalised data.

It is a "Wide Scale network of E-systems for Multimodal Journey Planning", as explained hereinafter. There are various Journey Planning systems in operation which find route information for various types of transport modes with variant geographical scope either urban, metropolitan, regional or national. International travellers need to combine information from different information sources, while at the same time they are not used to visit such systems or they do not even know their existence or their names to reach them electronically. The necessity to build a network of these E-systems, the Journey Planners, is evident. The network should have the ability to construct responses for Multimodal Journey Planning based on the information elements brought by the responsible journey planners. The information that comes from urban, regional or national Journey Planning engines, do become the components of a planned trip, that might or not reach the status of being an actual trip and finally a performed trip. At all stages, this information combined with similar information from other Journey Planning Systems and other trip information, form the whole end-to-end path of a personal trip. Getting across countries requires the collection of all necessary components of such partial trips, through digital integration of all serving engines. The project calls these serving engines, the participating engines or the participating Journey Planners. To achieve this, a centralised coordinating entity was constructed that has the connector interfaces to all participating engines. A unified but simple interface has been designed, aligned to the following principles:

- Be open and simple so that in future, more Journey Planners become connected into WISETRIP system with minimal development effort being necessary
- Keep minimum data set at the central level, and leave the destination knowledge at the participating engines, which need to validate also the user input when and if that is necessary.

Based on the concept above, the core algorithmic interface has been designed and been implemented; it performs validation of trip query components, analyses them into partial queries, identifies gateway nodes and the relevant Journey Planners to utilise and finally submits the partial queries. When it receives partial results, it combines them to form the final compound result and present it to the end user. The system interface functions over fixed web, on **www.wisetrip.travel,** and on mobile interfaces. Advanced user interface goes beyond typical trip search; it provides the ability to filter results, define preferences upon transport modes as well as gives the ability to build the trip based on already defined paths of the trip.

In addition, WISETRIP features "Delivery of Trip Intelligent Personalised data" according to its title. It includes, a set of personalised services that aim to assist the user at all trip stages. The user can create and keep his personal space where he/she saves specific trip responses. Based on the stored trip – his/her personal trip - the system creates a structure, - we call it the personal trip life-cycle- that represents a time schedule running over all trip stages along with pre-defined notification messages associated to each point in time. The user can choose which notification to receive. Moreover, he/she can configure a set of reasons and criteria that can trigger alerting information based on both periodical validation and extraordinary event data. Alerting can lead to trip re-planning suggestions. The information is called Trip-Intelligent because it is based on the user selected trip, combined with real-time information and the personal preferences.

The above services were tested by panels of expert users from all participating countries (Greece, Finland, United Kingdom, China, Italy, Spain) and were demonstrated to the general public through **www.wisetrip.travel**. Usage initiated requests for trips and stored trips along the following places: United Kingdom, Finland, Greece, metropolitan area of Florence and Hangzhou – city of China. A

broad assessment took place based on multi-fold methodology. The assessment confirmed the acceptance of WISETRIP services by the users and validated the necessity of the system and its responsiveness into addressing the traveller need towards easier trip and time management. Users also expressed their concerns for future advancement, including the critical need to complete the system in terms of content and to remain affordable in terms of costs. The life of the system depends on the will of the implementers and journey data contributors to continue operation and data provision. This has been validated and typically agreed. But, to become widespread, WISETRIP is expected to expand, cover more destinations, through the integration of more Journey Planners. An open invitation to more Journey Planner across Europe is in place. External communication channels of the project included an External Users Group that includes more than 58 members from 18 countries. Exploitation planning tasks identified, described and compared variant feasible business models along with their future development and marketing plans. A combination of a user subscription model with eTourism services such as ticketing and accommodation is a challenging business opportunity for the resulting work. Further research and innovation development route has been also designed, towards advanced intelligent management of trip strategies, energy efficiency considerations and inclusion of real-time event data within the system knowledge.

1.2 Description of WISETRIP project context and objectives

Mobility and demand trends of tourism, travel and citizen transport need multi-sourced and combined data from various actors in the passenger transport domain for information and route guidance. The simple question remains 'how and when should I best go from place A to place B?' - even given specific addresses of Place A and B rather than city or location names - and the complex way to get the right answer has to take into consideration all alternatives and even more, adapt the answer to certain conditions which can be defined by the person who asks. Such conditions are the user preferences related to time, cost, number of hops and other parameters of a trip.

Currently existing commercial systems for journey planning are providing adequately such services at a regional level (e.g. within a city) or on the basis of a single-mode transportation (only flights), but the combination of multi-level information (urban and interurban) at a wider scale and the delivery of dynamic personalised data has not been yet properly addressed. However, though such systems are known and popular to citizens at the location covered by these systems, the traveller – and moreover the international traveller – is not aware of their existence or does not even know the names of the systems. Henceforth, he does not use them and he is not aware of local transport media and how they can serve the partial ending phase of his trip[2]. Based on this fact, **a multi-source and multi-modal planning service should be developed, that can link and cooperate with the necessary Journey Planning engines so that the travel can easily query, at any place and time before or during a journey, and become aware of all solutions for the trip.**

Figure 1 below gives an example of the underlying transport network for an international journey planning problem. The proposed itinerary includes an intermediate national journey from A1 to A3 (a city with international connections), two international transport segments from A3 to C1 of country C by plane and from C1 to D2 of country D by ferry, and finally an intermediate national journey in country D from city D2 to the destination city D3. To complete the path, an information service should find and combine information sourced from more than one domains of knowledge and transport information control.

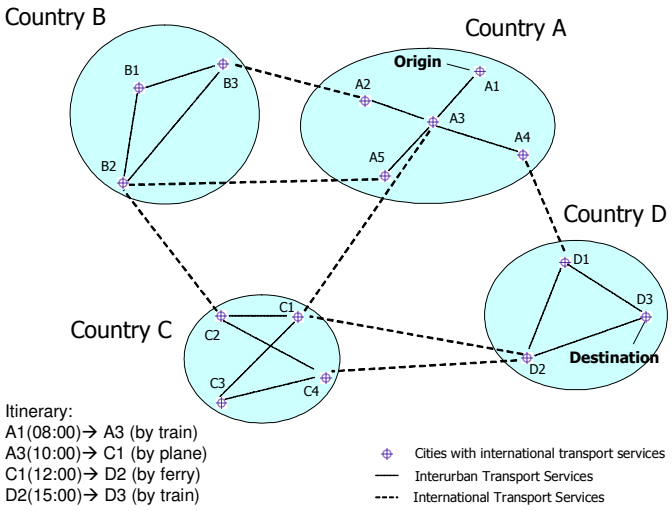

Figure 1: International Journey Planning

Apart from the synthesis of information that comes from variant Journey Planners and is used mainly for information and planning purposes, the final choice and the performance of a trip are mostly affected by variant parameters, either personal preferences or dynamic and changeable parameters of a trip. Information about actual time of departure, cancellation of a planned trip, modifications of schedules and real time events that might affect trip performance (i.e. traffic, accidents, weather conditions), are also necessary for the traveller. The whole grid of trip parameters can compose a

[2] Most International Journey Planning systems are relying on the use of Global Distribution Systems for airlines or railways.

personalised set of information that should be delivered to the traveller at the various steps of the trip process, via various means of communications that are enabled though both fixed web (at home or at work) and mobile applications environment. To fulfil these needs, **a Journey Planning service is required to identify and create through a decision mechanism process, as well as finally deliver, personalised information either before or during the trip process**.

The fundamental concept of the project is the co-ordination of systems that provide journey planning services to cooperate creatively and form complex answers, produce real-time personalised information and deliver it at crucial points of the trip cycle. In this way, **existing independent systems for journey planning become active subsystems of a unified service, operating as a network of coordinated Journey Planners**. Henceforth, the scope is to enhance the present type of journey planning service through a PC or 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. The concept is for the system 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.

The challenge of the WISETRIP project is **not to develop a central system that competes existing journey planning systems but to provide an open framework for Journey Planners to participate into a service that builds and enhances services based upon the cooperation and interconnection with existing systems, and thus becoming a reference point, an one-stop shop for users to find and utilise journey planning services across the world, increasing at the same time seamless information provision and personalised delivery.**

To summarize,

the overall objective of the project is to develop an innovative mobility service platform for the provision of multi-modal travel information, through a personalisation engine based on multiple personal criteria, sourced from connected journey planners and accessible anytime through various mobile or fixed devices before or during a journey.

The use of WISETRIP platform by a traveller, as a trip planner and personal trip assistant, will make travelling easier and modal change management will be much easier to accomplish. Avoidance of tiring situations within European travel, readjustment and optimisation of a scheduled trip even if traveller is on the move, reduction of traveller's uncertainty and increase of safety sense are among the most important impacts. Of course to bring its effect closer to the desired impact level, WISETRIP needs a wide European expansion, through the participation of many countries, transport operators and journey planners.

Apart from the project concept, and before one starts to implement, he must identify the context environment that is mainly depending on the variety of the existing systems.

Knowledge extraction from other relevant projects was useful in order to achieve integration of their outcome into WISETRIP as well as re-use data models, use scenarios and consider their experimentation and demonstration findings. According to an international survey conducted during the project between 25 different journey planners from 8 European countries plus China and Japan most of them do not provide alerting services, regular updates, early requests, real-time data or incident information and there is no ability to input a certain location or route into your search query. Besides, not all journey planners have the same approach for the time criteria used in the input query; they do not have the same sorting and filtering capabilities of the output or dealing with the same proximity. Complexity arises when either city/nation or transport network system boundaries have to be crossed, to form a path that includes destinations, intermediaries, transit points, types of moves and changes of transportation modes. Additionally variant user scenarios form a complex grid of requirements should also be satisfied. Indicative use scenarios that guided the orientation of WISETRIP services are described below:

- **Scenario 1 "Seeking fewer hops within the trip & wanting On-trip notifications for changes"** A user wants to travel from Finland (city of Pori) to Italy (Florence) with a limited amount of hops. Thus, the main question is how to get to Florence quickly and easily;

therefore the preferred long distance leg takes place by airplane. *The user needs to be aware and will be informed of the possible changes during his/her trip (on-trip information).*

- **Scenario 2 "Need to redesign trip plan in cases of unexpected change"** The same scenario – as above – can be implemented in a different way. The user will not be aware of the possible changes in his/her trip automatically, but he/she will experience the change himself/herself, i.e. a cancellation of an interim flight, or a train arrives late at its destination or the user himself/herself looses a plane. *At that time and onwards, the user wants to re-plan the trip based on these urgent and unexpected events that he/she faces during the trip.*
- **Scenario 3 "Seeking for the cheaper trip solution – Ability for online booking".** A user wants to travel from Italy to Finland economically, so the amount of hops and the time needed are not important. The main thing is to get to Finland as cheaply as possible*. If possible the user would like to book and pay, when using WISETRIP, all the partial trip solutions that build the preferred trip path.*
- **Scenario 4 "Complete Trip information in familiar language".** A Chinese tourist wants to visit Greek islands and especially Santorini. The trip should be as easy as possible with not too many hops and interchanges. The user will separately arrange the flight from the Shenzhen Bao'an International Airport to Athens and back (predefined segments) and then plan the other segments around it. The tourist wants to go the Shenzhen Bao'an International Airport by bus and wants to know the proper connections. In Greece she will take a taxi to a suitable ferry in the Piraeus harbour to get to the island of Santorini and there to the village of Oia. *The main demand is to have the user interface and get the instructions in Chinese, since she is not good in English not to mention Greek.*
- **Scenario 5 "Complete Trip Information not yet available".** A Scottish citizen plans his holidays for the summer. He selects Greece to be his holiday destination, and especially the island of Folegandros. It is already early March, and he is interested to have his holidays within the 2nd half of July. He has used several online systems to decide how and from where to fly from Scotland to Greece. However he cannot complete the whole path to Folegandros. It is usual the case, that ferry companies in Greece have not defined their ferry schedules for the summer early enough (and especially in early March), and not any online system can provide full details of trip information from Athens to Folegandros. The user keeps his plans frozen and decides to check regularly whether there is available information for his trip. *His wish is to have a reliable service that regularly checks availability of information so that he can get complete information as soon as there is an available trip response that serves his needs.*
- **Scenario 6 "Change of Vessel"** A user that has selected a trip knows that he will arrive in Athens airport at a specific date and time, and he will get to Piraeus by metro and electric railway, expecting to be at the airport much time before the ferry departure. According to the plan and the tickets he is having, the ship name is "Express Pegasos" and will depart from Gate E. However, that ship had been damaged one week before, and another ship named "Express Naxos" has taken its place, departing from Gate A. The user arrives at Gate E, where he realises the change. Until then, he had already walked (carrying also his suitcases) a long distance from the rail station to Gate E, and now he needs to walk 500 meters more to move to Gate A. *An early notification about the change either when the change was realised or just two hours before ship departure, would have saved time and effort of himself and his family, and this would be a desirable and valuable service.*
- **Scenario 7 "Integration of Urban paths into International trip – Door-to-door journey planning".** The traveller wants to move from Aberdeen to Tampere. He will get trip information for various alternative ways for his move. However, *he additionally wants to accompany all available trip proposals with the urban paths that can carry him from his exact address to the various nodes of its trip, as well as from his last terminal to the exact destination.*
- **Scenario 8 "Regular Life Cycle Information".** A traveller from Europe travels for the first time to China. He will follow a path involving walking-metro-airport-airport-airport-rail-bus up to the final door destination. He is not aware of any access information. *Getting, just the right*

information before every transit and terminal station, will make his life easier. For instance, such information can be about: how to access each station, where to buy bus tickets, how to move into terminals/stations, names and signs written in the local destination language etc. This information will be in parallel to the various phases of the trip life cycle.

- **Scenario 9 "Frequent traveller – Regular Update Information".** A business traveller travels almost monthly or weekly from the same location in UK to a certain place in Finland. *He desires to have regular update of information about this trip, on a regular basis, so as to be aware of any changes of schedules*.

In this context, and in order to satisfy the above presented scenarios, practical milestones and objectives were set within the project progress. Specific objectives of WISETRIP are the following:

A. Specify well-defined user scenarios and requirements of multimodal transport at a wide geographical scale involving metropolitan, regional, urban and interurban levels. Scenarios, similar to the ones mentioned above, end even more, guided the orientation of WISETRIP services and are supported through the grid of functions that the system and its interface provide. All the scenarios are considered as of personalised use, because the necessary functions and information can be enhanced with user-specific requests and automated push data either at pre-trip phase or during the move.

B. Define and design the overall system architecture and Data Model considering the user scenarios and requirements set, based on the needs of the international traveller and the promotion of remote (rural destinations).

C. Specify the trip lifecycle process, at all phases of a trip in order to in order to define rules upon which information is processed and sent to the traveller throughout the entire life-cycle of his/her trip.

D. Define clear and precise interconnection guidelines for journey planners systems. Define in a well-documented manner and specify the interfacing requirements for each participating journey planner and the general interfacing and functionality guidelines for every new journey planner to link to the core system, so that they can become active components of WISETRIP to expand its geographical coverage to new cities, regions, or nations.

E. Design the algorithmic solution in order to coordinate results from different systems. Problems might arise due to geographical overlap of different cooperating systems, due to the different behaviour of algorithms utilised by them and gaps of information in partial responses might exist. In general, the heterogeneity of participating systems needs efficient algorithmic measures.

E. Define a uniform information delivery service with personalised features and multiple utilised devices for information push and pull. Delivery services should be based on technologies that secure open services and interoperability. The aim is to make the system available onto variant interfaces either integrated within web portals or mobile device applications.

F. Integrate the overall software modules, validate the WISETRIP platform and test the functionality in both laboratory and real-life conditions, in order to show that unification, combination and communication synergy among journey planning engines is feasible and can become useful to the public and the tourism /travel industry, via an open interface available to multiple types of devices.

G. Demonstrate the unified service monitor and validate its performance and operation within real user scenarios at the sites of the project. System should be assessed in terms of scalability and performance in order to identify possible restrictions and necessary solutions towards wider deployment and business orientation. A user acceptance survey should be included base on several criteria related to the data quality, their accuracy and adherence to real needs, the quality and easiness of the user interface and the willingness to pay.

H. Form an External Users Group comprising of users, public authorities, transport operators, etc.; provide continuous update of this group with news about the project results and achievements, and distribution to them of promotional activities, invitations, newsletters and other publication information.

I. Define a sustainable exploitation strategy, through the study of the trends and needs of the transport and travel market as well as the results of the overall evaluation, and define a business model that will ensure the optimum commercial exploitation and utilisation of the project's results. Commercialisation roadmap and directions will be based on feasibility criteria, assessment of risks and the findings of the study of the potential business models.

1.3 Description of the main S&T results/foregrounds

1.3.1 WISETRIP System – Description of services

The implemented WISETRIP system is a user-friendly and easy-to-use combined transportation information system, able to get requests and provide multimodal trip answers and travelling information. Main services provided to the users include:

- public trip search (simple or advanced), where each user specifies his/her query for a specific trip and the associated criteria and WISETRIP system replies with a list of available trip solutions,
- profile management (user account), where the user configures or edits his/her personal data and travelling criteria and registers specific trips he/she is interested for,
- personalized trip services, where the user specifies a) the parameters and conditions according to which, personalized messages are triggered and sent and b) the types of messages that he prefers to receive.

WISETRIP system and services are demonstrated under the www.wisetrip.travel web site and its mobile versions (mobile application and mobile web portal). For demonstration purposes a limited number of routes within Greece, Finland, UK, Italy and China are supported by WISETRIP platform.

More information about the WISETRIP demonstrators and the different front-end interfaces that have been implemented is provided later in this section, in paragraph 1.3.1.4

1.3.1.1 Finding a Trip

Trip searching is the main service provided by the WISETRIP System, the typical Journey Planner service, but adapted to multi-modal, international trip query. In WISETRIP case, origin and destination names are written free by the user and are validated by participating Journey Planners, according to their knowledge and dataset.

It is a public service, available for all end users, without registration in advance. Two versions of trip searching are provided: the simple search and the advanced search.

Simple Search: To search for a trip, the user has to select the country of origin and the country of destination from the relevant dropdown lists, and type the city of origin and destination accordingly in the relative fields. In cases where the city is not spelled correctly or some names are not recognised by the cooperating journey planners, the system offers "similar" alternatives and user must select the one that corresponds to his/her preference by a dropdown list. Moreover, user has to select the date and time he/she wishes to travel and to indicate whether he/she wants to depart after or arrive by the specified time and date.

WISETRIP system utilises its real time connection with the appropriate Journey Planners (external journey planning systems) and is searching for all available trip solutions. All available trip solutions (with a maximum of 50 solutions) appear briefly on a table. For each trip, user can view the following information:

- Origin,
- Destination,
- date and time of Departure,
- date and time of Arrival,
- the Duration of the trip (in hours),
- the Transport Modes used,

- the international hops, and
- the estimated price (where applicable).

Trip solutions are ranked and presented to the user by duration -the shortest trip is presented first. Trip results can also be sorted by departure or arrival date or even exclude specific transport modes (maximum 2) according to the user's preferences.

Figure 2 below presents the WISETRIP screens for simple trip searching and the relative trip results.

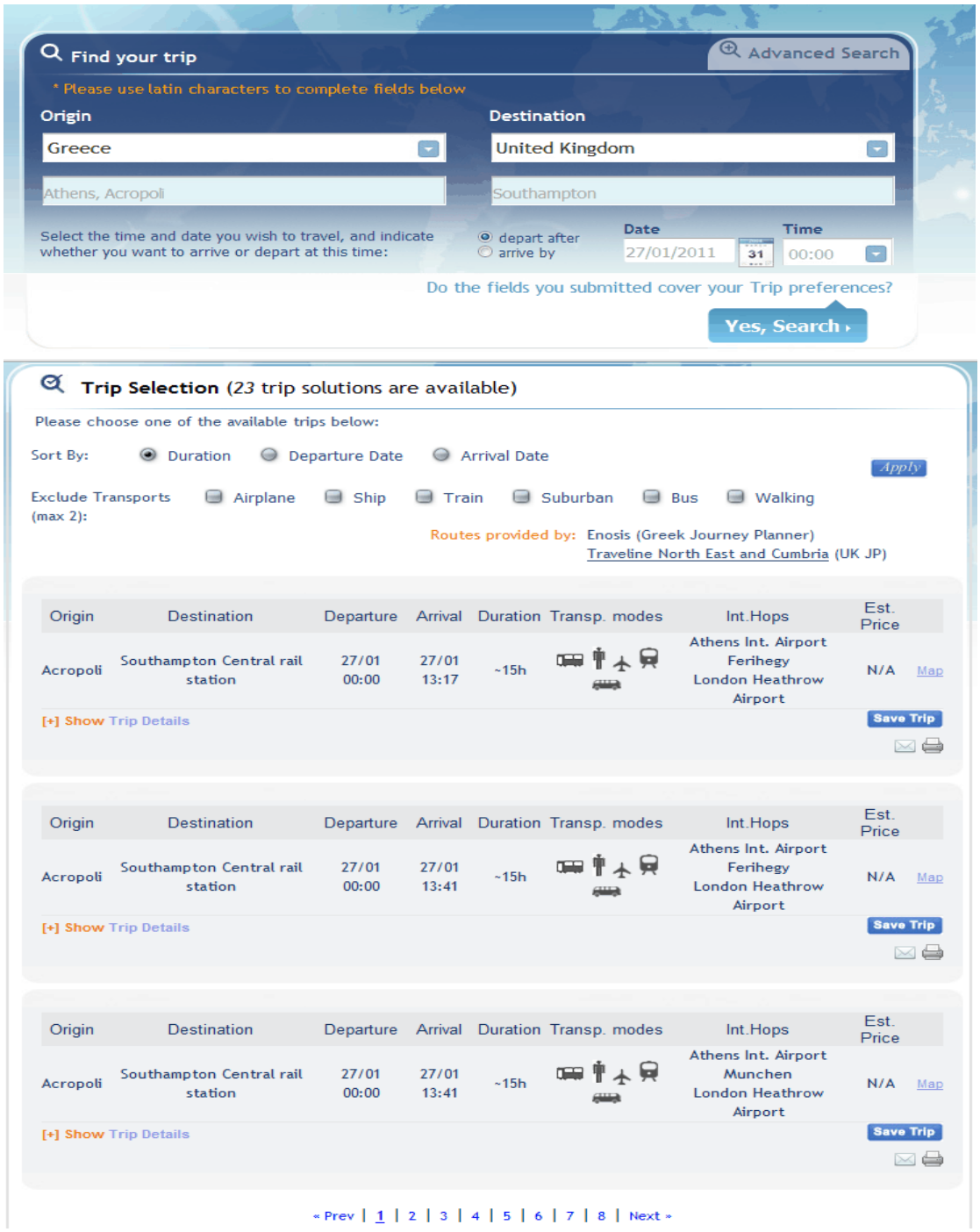

Figure 2: Simple trip search and trip results

In a more detailed view each trip is divided in one more trip segments, as presented in Figure 3 below. Again, for each trip segment Origin, Destination, date and time of Departure and Arrival, the Duration of the trip segment, the Transport Mean (mode and company name) used, and the

estimated price where applicable are presented.

Routes provided by: Enosis (Greek Journey Planner)
Traveline North East and Cumbria (UK JP)

Origin	Destination	Departure	Arrival	Duration	Transp. modes	Int.Hops	Est. Price
Acropoli	Southampton Central rail station	27/01 00:00	27/01 13:17	~15h		Athens Int. Airport Ferihegy London Heathrow Airport	N/A Map

[-] Hide Trip Details — Save Trip

Segm.	Origin	Destination	Departure	Arrival	Duration	Mean of Transport	Est. Price
1	Acropoli	Athens (Centre - Omonia)	27/01 00:00	27/01 00:18	~18min	METRO LINE 2	N/A
2	Athens (Centre - Omonia)	Omonia (to Kifisia)	27/01 00:18	27/01 00:34	~16min	- WALKING	N/A
3	Omonia (to Kifisia)	Kato Patisia - KTEL Liosion	27/01 00:34	27/01 00:42	~8min	URBAN RAILWAY LINE 1	N/A
4	Kato Patisia - KTEL Liosion	Station Iperastikon Leoforion Liosion (to Athens International Airport)	27/01 00:43	27/01 01:10	~27min	- WALKING	N/A
5	Station Iperastikon Leoforion Liosion (to Athens International Airport)	Ktirio Anaxoriseon (end of Line Athens International Airport)	27/01 01:10	27/01 01:59	~49min	URBAN BUS Athens Kifisou Interurban Bus Station - Athens Airport (Express)	N/A
6	Ktirio Anaxoriseon (end of Line Athens International Airport)	Athens Airport	27/01 01:59	27/01 02:05	~6min	- WALKING	N/A
7	Athens Int. Airport	Ferihegy	27/01 05:00	27/01 06:05	~2h	Malev Hungarian Airlines	N/A
8	Ferihegy	London Heathrow Airport	27/01 08:20	27/01 10:05	~2h	Malev Hungarian Airlines	N/A
9	Heathrow (London) Central Bus Stn (Rail-Air)	Reading rail station	27/01 11:15	27/01 12:08	~53min	First Great Western	N/A
10	Reading rail station	Southampton Central rail station	27/01 12:15	27/01 13:17	~1h	CrossCountry	N/A

Figure 3: Detailed trip presentation

Advanced Search: The "Advanced search" page has the same features as the simple search, simply enriched with more advanced searching criteria and more specifically:

a) Predefined International Trip, where user has two options:

- Predefine International Hops: user selects specific international airports of the country of origin and destination he/she wishes the trip to begin and end, from dropdown lists created according to the Origin and Destination Country user specifies.
- Predefine International Trip: in this case user types the origin and destination city of his/her predefined international trip. The city of origin (and destination) must be a node of the origin (and destination) country selected before. User must also insert the time and date that the predefined trip starts and ends using the corresponding fields.

b) Excluded transport modes: where user has the option of excluding one or more transport modes (maximum two) from the search process, by selecting the relevant radio button, or just let WISETRIP to follow the selections user has made in his/her profile.

Example: *In Figure 4 below an example of an Advanced Trip Search request is presented. User is looking for a trip the monument of Acropoli in Athens (Greece) to the Central Rail Station of Southampton in UK. However, he/she declares to the system that he/she already has booked a specific international trip starting from Athens Int. Airport at 9am Greek time and arriving at London Heathrow at 11am UK time. Moreover, he/she defines his/her preference not to use bus during the trip. In this case the system will provide to the user trips from Athens, Acropoli to Athens Int. Airport and from London Heathrow to Southampton Central Rail Station excluding bus from the transport means.*

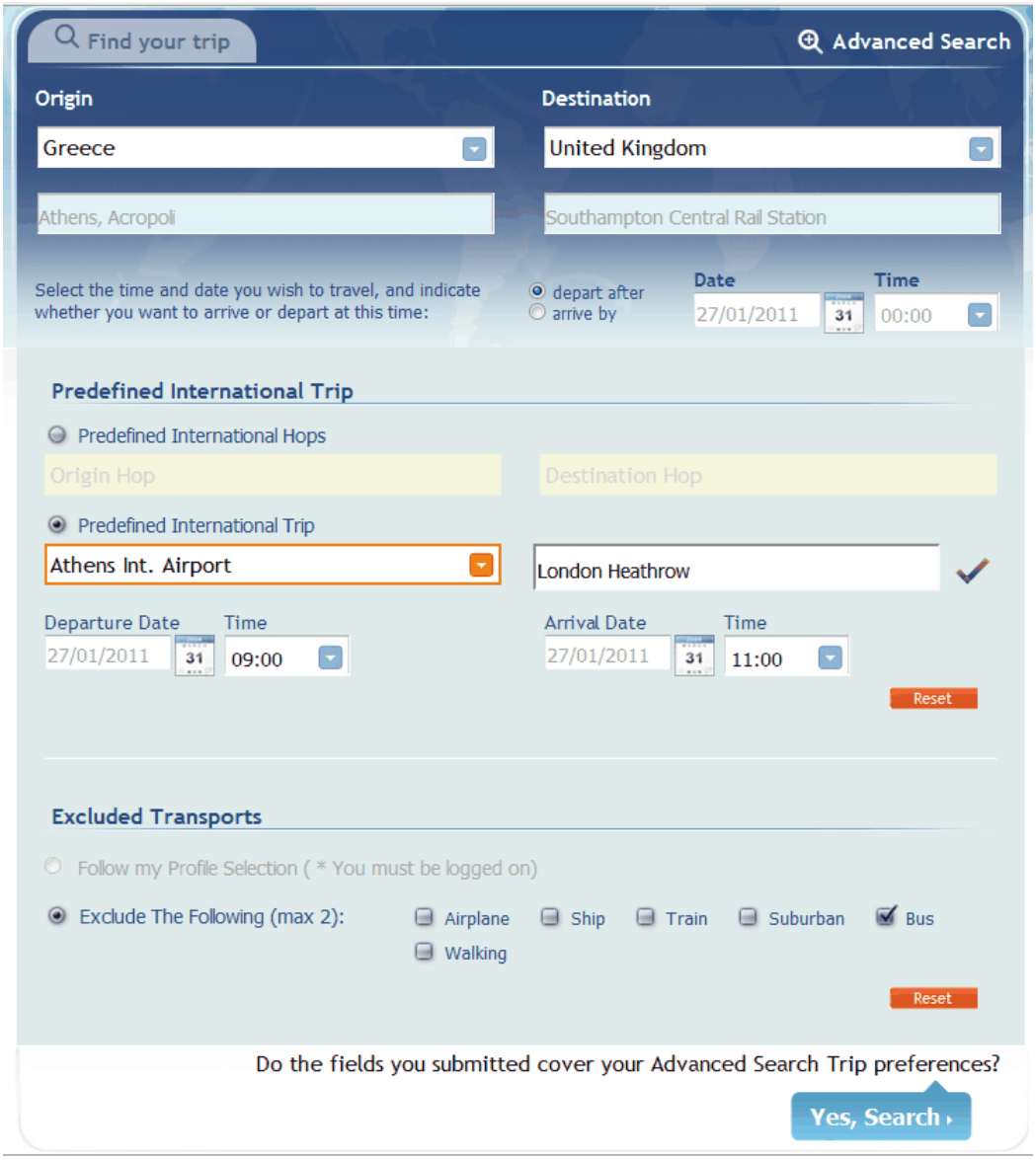

Figure 4: Advanced Search

1.3.1.2 Profile management

Any user can register to WISETRIP and create an account/profile. It has to be mentioned here that profile creation is available only from the WISETRIP web interface and it is not supported by the mobile interface.

Profile creation: User registration is taking place in four sequential steps, where user specifies login information (username, password and email), personal details (full name, date of birth, sex, preferred language, full address information, telephone and mobile number) and trip preferences (excluded transport modes, e-mail and SMS notifications). From the above information some are mandatory, while other is optional. Figure 5 below presents the second step of the registration

process where user has to enter his/her personal details.

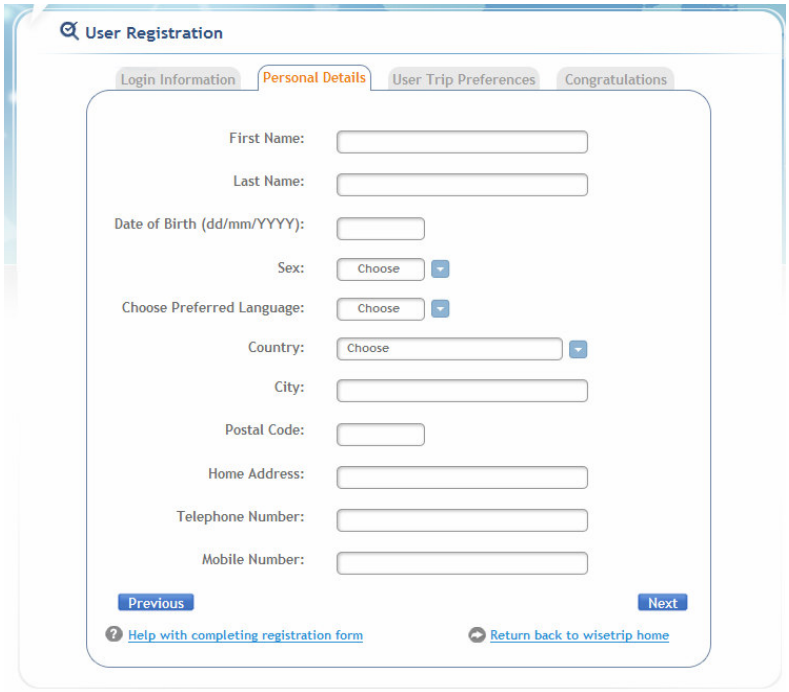

Figure 5: User Registration – Step 2: Personal Details

Profile editing: A registered user can at any time login to the profile section and edit his/her preferences. Entering to his/her account, the user can see (Figure 6 below) a Details Summary on the left of the screen, where a summary of data provided during his/her registration appears, and four tabs (Login Information, Personal Details, User Trip Preferences, and My Trips) that can be modified at any time according to user's preferences. The first three tabs are in full correspondence with the fields submitted at the registration phase. The fourth tab "My Trips" presents any trip solution user has specified that he is interested for and it is the only service related with user's profile accessible also by the mobile interface.

Figure 6: Profile Section

1.3.1.3 Personalised Trip Services

As mentioned above any user (registered or not) can use the Simple or the Advanced Search service and specify his/her trip request, and WISETRIP System replies with a list of available trip solutions (see Figure 2). User can select from this list the trip that covers his/her preferences but trip selection is a service provided only for WISETRIP registered users.

All saved trips are stored in "My Trips" page (see Figure 7) and are separated to "Active" and "Expired" Trips depending on the departure/arrival date. Only for the "Active Trips" user can set the Trip Services he/she is interested for. More information about the provided Trip Services is presented below.

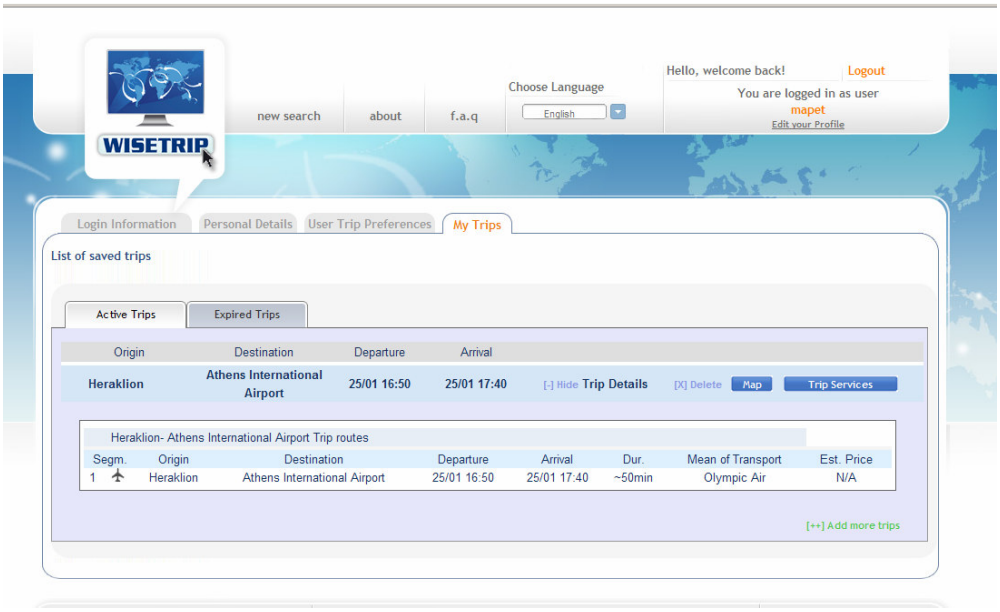

Figure 7: Active Trips

Trip Services: Personalised "Trip Services" are provided for all Active Trips and obviously are available only for WISETRIP registered users. A set of services is predefined, however user can make modifications.

Seven categories of personalised services are provided:

1. My Preferences: user is able to choose the mean (SMS or email) that will be used by the system to notify him/her about selected trip. Moreover, user sets the time that a trip will arrive active as well as the maximum percentage of walking time he/she can speed up if delayed,
2. Scheduled Notifications: user can set up the type of trip events (e.g. boarding, wait etc.) he/she wants to be notified for, and the time that this notification will be sent,
3. Trip Disturbances Alerts: user selects for which types of trip segments (e.g. international) he/she wants to receive any disturbances info affecting the trip as presented in Figure 8,

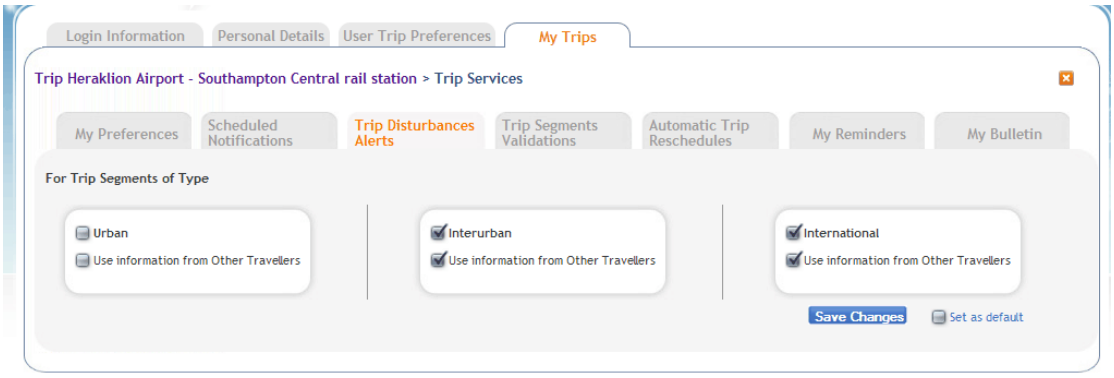

Figure 8: User selects to be notified only for interurban and international trip segments, even if the notification has been reported for another travel

4. Trip Segments Validations: user sets the time period that the validity of trip information will be checked by the system,
5. Automatic Trip Reschedules: user defines for what reasons (e.g.: unsuccessful validation, disturbance etc.) the system should automatically provide alternative solutions for the redesign of a trip (see Figure 9)

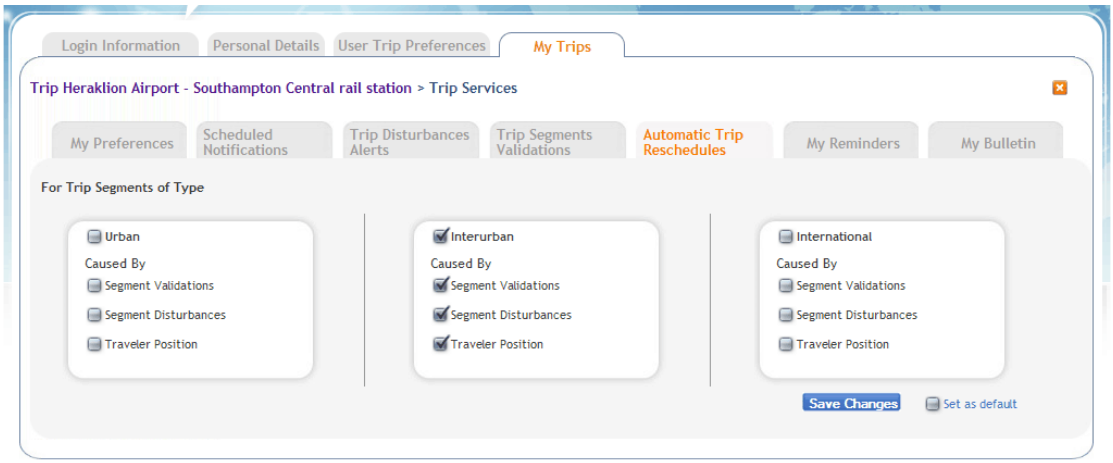

Figure 9: User requests from the system to provide alternative solutions in case of disturbance in the interurban segment

6. My Reminders: user can set messages he/she would like to receive before or during the trip, as presented in Figure 10. User selects the specific trip segment where the message applies as well as the time that it will be sent.

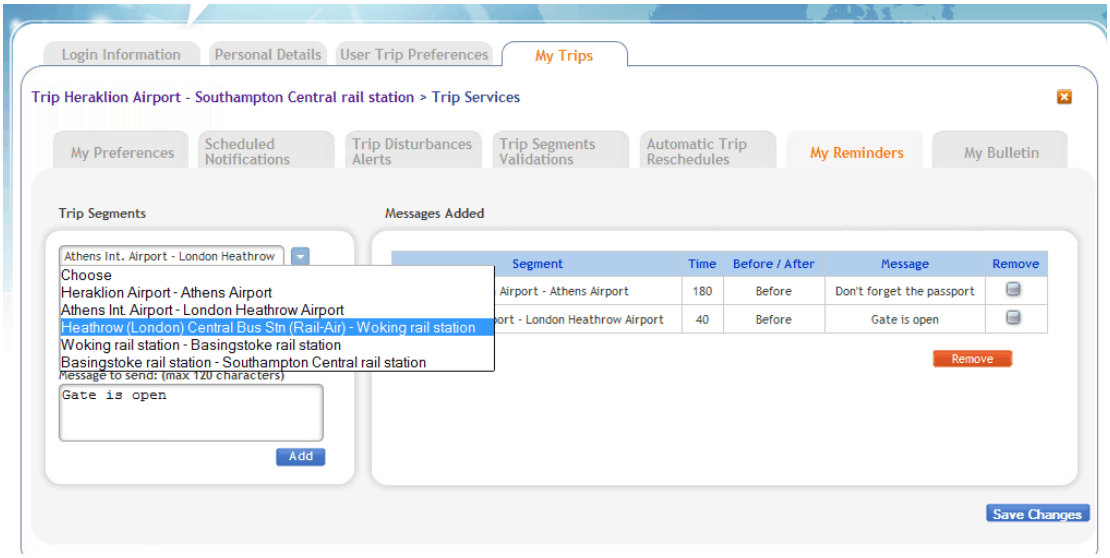

Figure 10: User specifies that 40min before the "Athens – London" segment he/she wants to receive the message "gate is open"

7. My Bulletin: this category of services (presented in Figure 11 below) refers mainly to mobile users since it serves as a means for the user to notify WISETRIP about his/her position during a trip and inform about any delays (so that WISETRIP reschedules his/her trip accordingly) or about any disturbances during the trip, so that other WISETRIP users can also be informed

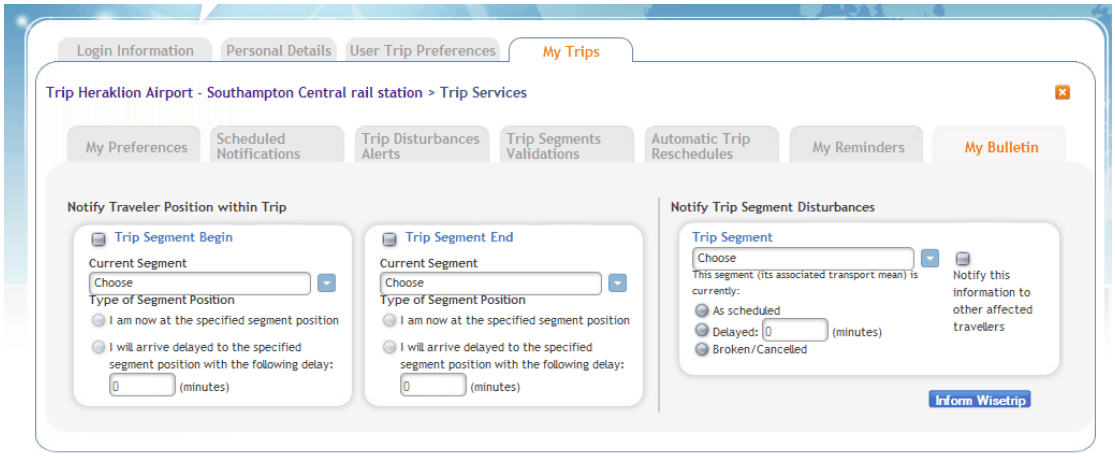

Figure 11: User can inform WISETRIP that a specific trip segment is cancelled and he/she allows this information to be distributed to other affected travellers

1.3.1.4 WISETRIP User Interfaces

As mentioned before, WISETRIP transportation information system accompanies the user starting from the search of a route and the time of his/her departure, until the arrival to the final destination. To this end a set of front-end interfacing mechanisms has been implemented, allowing the distribution and presentation of WISETRIP services at several devices, connected at the Internet. More specifically, the fixed web interface (web portal) is available at www.wisetrip.travel. The portal provides also access to download the implemented mobile application. Moreover, an interface suitable for iPhone Safari browser has been implemented.

1.3.1.4.1 WISETRIP Web Interface

The basic demonstrator of WISETRIP system is the web portal www.wisetrip.travel. It is a multilingual interface (available in English, Finnish, Greek, Italian and Chinese) providing all functionalities and services described above.

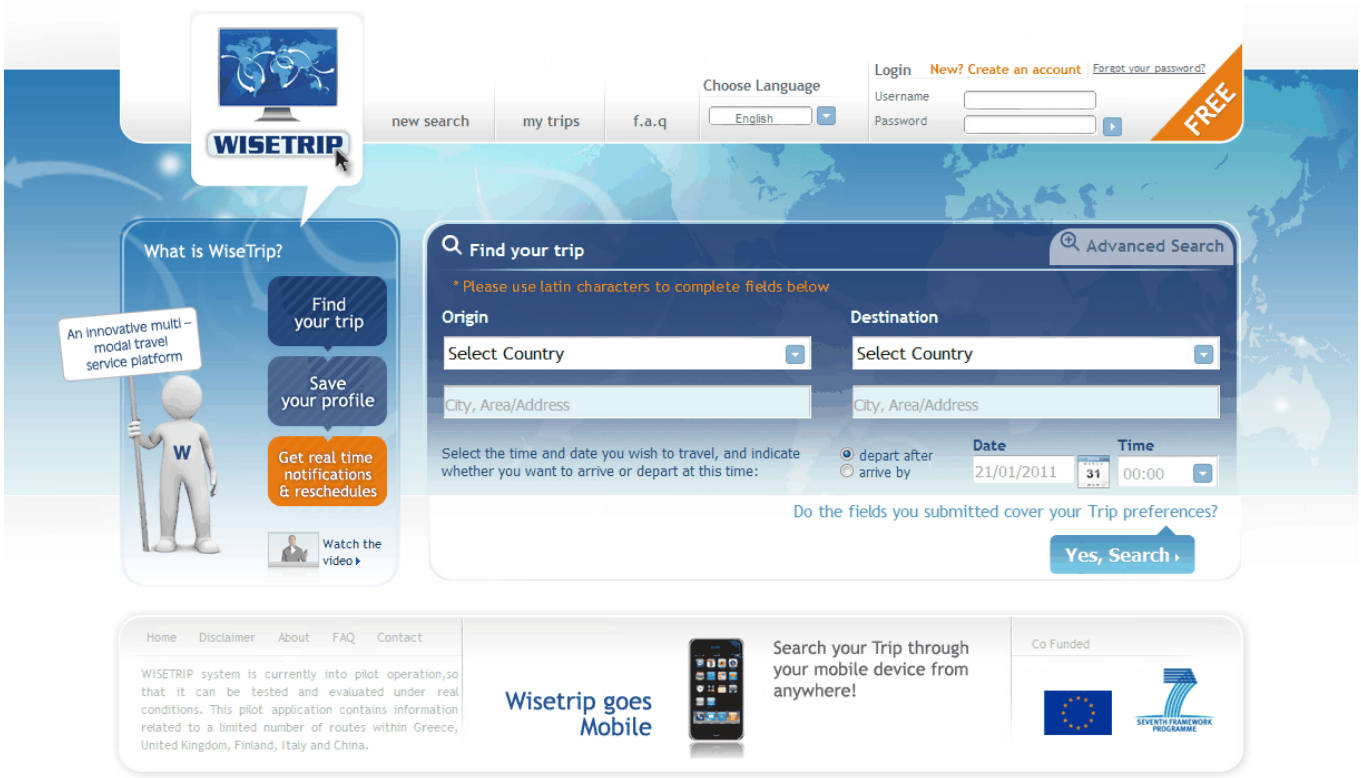

Figure 12: WISETRIP Web Interface – Home Page

WISETRIP web interface is compliant to the most wide spread used web browsers, like Internet Explorer, Mozilla Firefox, Google Chrome and Safari. To be fully functional user has to enable in his/her browser JavaScript, Cookies and Flash options.

1.3.1.4.2 WISETRIP Mobile Application

For the user on the move, the WISETRIP Mobile Interface has been implemented and presented in Figure 13 below. It is a native application that can be installed into any mobile device running Windows Mobile 5 PPC and Windows Mobile 6 operating system with a touch screen interface. It is available for download at the WISETRIP web interface at the following link:

http://www.wisetrip.travel/WisetripFrontEnd/private/WisetripGoesMobile.action

WISETRIP Mobile Application is available only in English and it serves different purposes than the web interface since it is oriented to be used during the trip. It runs on a small phone screen, which means that much of the information that is visible in the WISETRIP web interface is not shown, or is truncated. However, its main benefit is that it is very easy and quick to use.

Figure 13: WISETRIP Mobile Application – Home Page

WISETRIP Mobile Application can be used by devices connected[3] to the Internet. As mentioned before, WISETRIP Mobile Application has limited functionality, in comparison with the web interface. More specifically it can be used to search and save trips and send trip related disturbance and position messages. More specifically:

Only the simple trip searching (see Section 1.3.1.1) is supported, while the information at trip details view is cut down and includes for each segment only Origin, Destination, date and time of Departure and Arrival, the Duration and the kilometric Distance of the segment and the Transport Mode (only the type of the mode and not the company name and the mean name). Map representation of the trip is provided from the Mobile Application, supporting only map view functionality. Regarding trips saving services it has to be mentioned, that WISETRIP Mobile does not allow creation of user accounts. Users need to create an account into the WISETRIP system through the WISETRIP web interface and then they can save trips in this account though the Mobile Application. Finally, from the personalisation services (see Section 1.3.1.3) only the category "My Bulletin" is provided allowing messaging interchanges relative to trip disruption and user position.

Indicative screenshots of the WISETRIP Mobile Application are presented in the following figures:

Figure 14: Screenshots of the Mobile Application – Trip search, trip details, map representation and trip disturbance message

[3] The Connection Manager in Windows Mobile must be used to configure the desired connections. WISETRIP Mobile uses a connection according to the following rules: first it tries to use any active connection, and if no connection is found, it tries to connect to the default (pre-configured) WLAN profile. If that fails too, the application tries to connect to the default (pre-configured) GPRS profile. A USB connection to a host computer can also be used as an "existing connection", in which case WISETRIP Mobile will not try to connect a WLAN nor a GPRS connection.

1.3.1.4.3 WISETRIP Mobile Portal

During the project period significant changes were mentioned in the area of mobile technologies. Although not known at the start of the project and during the design phase, the last year i-Phones and Android smart phones became wide known and currently are covering about 90% of the smart phone market.

To attract users of these new generation smart-phones, an interface suitable for Webkit based browser has been implemented and it is available at: http://www.wisetrip.travel/WisetripMobile

This WISETRIP mobile portal is currently available only in English and it is mainly focused to Apple's Safari browser for i-Phone devices. Its functionality is the same with the WISETRIP Mobile Application presented above.

The following screenshots introduce the interface views of the WISETRIP mobile portal

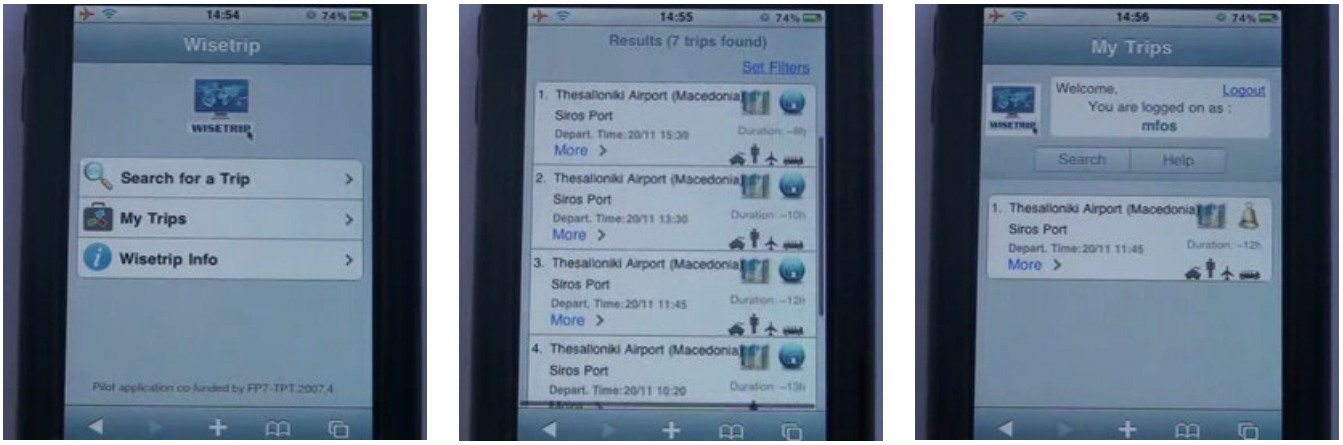

Figure 15: Screenshots of the Mobile Portal (1)– Home page, trip results and "My Trips" page

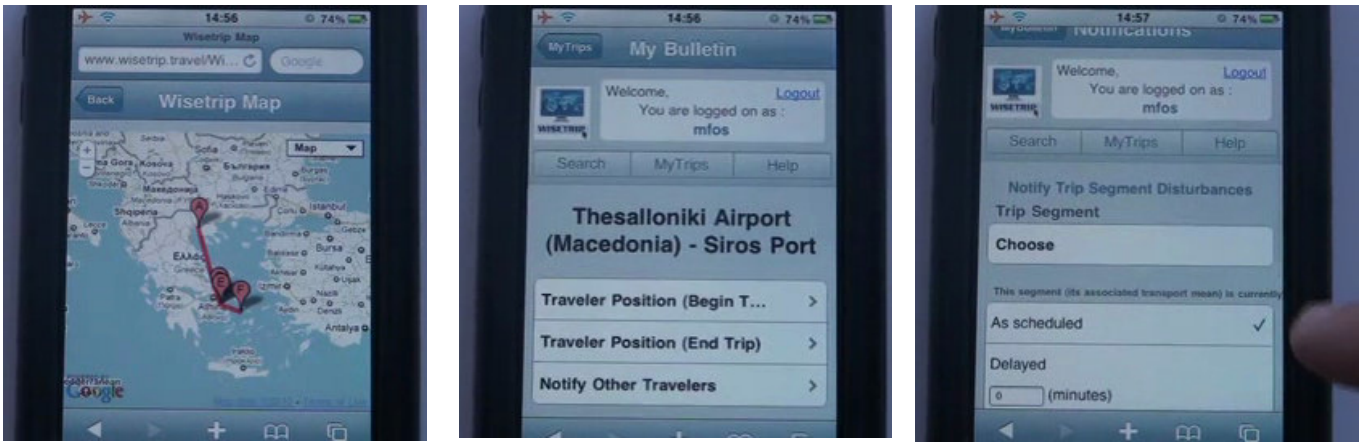

Figure 16: Screenshots of the Mobile Portal (2)– Map representation, "My Bulletin" services and notifications for trip disturbances

1.3.2 Progress beyond the state of the art

International journey planning refers to the decision making process where alternative international, national and urban transport segments are combined in order to identify efficient journey itineraries. This task involves various difficulties for the traveller: i) information regarding the relevant transport services is usually provided through different information sources which may not be easily accessible by the traveller, ii) the information provided is not fully comprehensive to the traveller who is not acquainted with the transport system of other countries, iii) the task of combining alternative transport options for planning a given journey involves substantial computational effort. An additional issue in journey planning relates to the contingencies arising in the execution of a journey. Delays or changes to any transport segment of an itinerary may endanger the viability of an initial journey plan. Thus, an additional difficulty encountered during the execution of an international journey relates to the lack of sufficient and/or comprehensive up-to-date information regarding the remainder of the traveller's journey. This issue increases the anxiety of the traveller especially when he/she goes through transport services with which he/she is unfamiliar [Grotenhuis et al., 2007]. It is evident that the provision of door-to-door multimodal journey planning and information services anywhere and anytime through a single point of access is a key issue in resolving the international travellers difficulties in planning and executing their journeys [Kenyon & Lyon, 2003; Peng and Huang, 2000;Adler and Blue, 1998]. Nowadays, the deployment of the internet and wireless information and communication technologies have enabled the development of internet-based journey planners for facilitating travellers in planning their travel decisions anytime and anywhere.

At the research level, substantial effort has been focused on the development of advanced transport 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. Some of these systems, which have been developed and evaluated by European Commission funded projects, are : IMAGE (IMAGE- Intelligent Mobility Agent for Complex Geographic Environments (2001-2003), IST-2000-30047), CRUMPET (CRUMPET -Creation of user-friendly mobile services personalised for tourism (2000-2002) IST-1999-20147), Wh@M (Zografos & Madas, 2003), ADAMANT(ADAMANT -Airport Decision And MANagement NeTwork (2202-2005) IST-2001-39117), eMOTION [eMOTION consortium, 2008], IM@GINE-IT [IM@GINE-IT consortium, 2004], ITISS (http://www.itiss-eu.com/, accessed on 20/10/2010), EU Spirit (http://www.eu-spirit.com/, accessed on 20/10/2010), and Start (http://www.start-project.eu/, accessed on 20/10/2010).

A critical review of the systems developed in the above research programmes and of existing internet based journey planners - as identified in a relevant survey performed within WISETRIP - led to the identification of a series of shortcomings of the existing journey planning information systems were specified. The analysis of the findings from the journey planners' survey has led to the identification of the following limitations of the existing systems:

- Lack of personalised travel information and information customised on the travellers' profile. For instance, additional detailed information may be required by a traveller executing his/her journey in a foreign country or in a region or city with which he/she is unfamiliar.
- Lack of on-line support of on-trip decision making for re-planning a journey.
- Limited (in terms of geographical and modal coverage) international door to door journey planning capabilities have been identified among the journey planners surveyed. The major causes for these limitations include: 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.
- Availability of fare information and ticket booking capabilities are very limited since they are only provided for specific transport services.
- Limited on-trip information services (e.g., real-time alerts) to travellers.
- Limited use of dynamic and real-time data in journey re-planning services.

WISETRIP system is aimed to address the above stated limitations by offering door to door multimodal journey planning and personalised – or even real-time - travel information services throughout the entire lifecycle of a journey. **The provision of personalized information is a key feature of the system since it offers the users the capability to store any itineraries determined with the journey planning service and select the types of notifications/alerts each user needs to receive in any phase of his/her journey.** WISETRIP system addresses on-trip re-planning and travel information needs through providing the user with personalized real-time alerts regarding any delays or other disruptions affecting their journey. The alerts are provided to the users while on-trip through mobiles phones. Each alert may also be accompanied (if necessary) with alternative options for continuing a journey with alternative itineraries.

Moreover, WISETRIP system addresses the limited geographical and modal coverage of existing systems by offering the user with the capability to plan international journeys covering all segments of the journey (urban, national, cross-border) through multiple transport modes. The determination of the alternative itineraries for continuing a ruined journey may be built on updated transport modes schedules, given that this type of information is supported by the corresponding participating local journey planners. In addition, a total re-planning of any journey may be achieved through mobile phones, since the WISETRIP mobile application supports the full scale journey planning service. The system provides the capability to integrate new journey planners (apart from those already participating) under the condition of building appropriate communication layers according to the relevant specifications. Thus, the geographical and modal coverage of the system may be further enhanced by integrating international, national or urban journey planners covering different countries/regions/cities and modes. Fare information and ticket booking capabilities are also integrated in the system through the provision of the appropriate web links to the booking engines (if available) for any part of a selected journey.

The overall concept of the interconnected multimodal Journey Planners into a unified service is by its own a case of uniqueness and innovation towards international journey planning. Though similar attempts have been recorded in the past, emphasis has mostly been paid to interconnect different international planning engines (i.e. airline GDSs and railway systems); urban transport planning remains outside the context of the problem. It also builds and combines fields of innovation sourced by the participating algorithms within the connected Journey Planning engines. WISETRIP goes even more beyond the state of the art by enabling different types of personalized services based on system automation, integration with real-time data providers and personal experience. Chosen trips are becoming the personal trips and form the basis of an information cycle at the hands of the traveller. **Design and system knowledge remains trip-centric which is the most substantial element of the personal data that are considered combined to personal preferences if these exist.** At its current stage, progress can be further made when the system should also take into account environmental criteria, as well as, intelligent trip strategies can be expressed and taken into account within the planning and replanning processes of a trip.

1.3.3 Project Implementation: from requirements to demonstration

1.3.3.1 User needs & requirements

A major task in designing WISETRIP involved the identification of the services and functionalities that should be incorporated in the proposed system. The objective was to determine and assess a set of potential system functionalities for WISETRIP on the basis of covering the user needs of the international traveller while complying with the technological, institutional, and business oriented constraints.

At the first stage a set of preliminary user needs has been identified taking into account 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. At a second stage the preliminary user needs were further assessed in terms of the weight of importance assigned to them by the end-users, through relevant surveys performed at each country represented in the project. The outcome of this process includes a list of specific functions and services for incorporation in WISETRIP. More specifically:

A set of preliminary user needs was determined by analysing the features of the major existing journey planners and identifying the gaps or shortcomings in the services offered. This goal was achieved by performing:

- Literature review for relevant systems: Based on the findings from the survey of existing journey planners and other existing evaluation 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), the literature revealed some of the fundamental user requirements for developing a good journey planning system. This includes the function of multi-modal and international transport information and delivery of real-time information to mobile phones. The rising demand from the customer point of view expects instant information which in turn requires increasing system complexity.
- Review of previous EC research projects of direct interest to WISETRIP; Four previous EC projects were found to be particularly relevant to WISETRIP: IM@GINE-IT, eMOTION, EU Spirit and ITISS. Their brief review proved that 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.
- An international survey of experience with internet-based journey planners: 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. Each of the participating WISETRIP Journey Planners was also included in the survey as this provided 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. 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 (they 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. Moreover, limited ticket booking was encountered (i.e. only for single mode).
  - The information offered by the journey planners is basically provided in the local national language.
  - 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 use of Dynamic and real time data in journey planning and information services.

The above findings determined the preliminary needs of users for information and journey planning services presented in Table 1 below.

Trip Stage	**Information Needs**
Pre-trip	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
En-route	Re-plan the remaining itinerary from current intermediate stop to destination
	Real time alerts about disruption of transport services affecting the trip
	Real time alerts about delays affecting the trip
	Reminder of the next transport service, departure time and boarding location (e.g. platform)
Post Trip	Points for Tourist info
	Points for Car-hire
	Taxi stand location

Table 1: Preliminary set of user needs

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[4] 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. Additionally a survey took place across five European countries (UK, Spain, Italy, Finland and Greece) and China, where end users were requested to determine and prioritize the associated system functionalities.

The analysis of the data collected through the end-users survey and the experts rating was based on the application of the Quality Function Deployment (QFD) method, which provides 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.

The outcome of this process was a list of potential system functionalities rated at least with a moderate importance score (a filtering process applied excluding those functionalities rated by the experts with very low importance score). Table 2 below presents the final 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 that might arise at its implementation.

System Functionality	**Relevant Constraints/Considerations**	**Level of Importance**
International door-to-door Journey Planning	TC4 Similar itinerary sorting TC5 Data representation variations IC2 Difficulty for cooperation between transport data providers BC1 International Marketing BC2 Companies Pricing Policies	High
Interurban Journey Planning	TC4 Similar itinerary sorting IC2 Difficulty for cooperation between transport data providers	

[4]They were eleven experts coming from the organizations participating in WISETRIP development.

System Functionality	Relevant Constraints/Considerations	Level of Importance
	BC2 Companies Pricing Policies	
Alerting through the Mobile Phone	TC1 Common/Similar Real Time alerts TC2 Itinerary regular updates TC3 No dynamic traffic data is currently handled TC6 Compatibility of mobile phone networks	
Requesting info through Mobile Phone	TC6 Compatibility of mobile phone networks TC7 Communication with external systems	
Profile creation	IC1 Personal data protection and privacy	Moderate
Journey related info storage/display/ deletion	TC5 Data representation variations	
Access of personal profile from a mobile phone	TC6 Compatibility of mobile phone networks IC1 Personal data protection and privacy	
Urban Journey Planning	TC4 Similar itinerary sorting	
Access of personal profile from the Internet	IC1 Personal data protection and privacy	
Alerting through the PDA	TC1 Common/Similar Real Time alerts TC2 Itinerary regular updates TC3 No dynamic traffic data is currently handled	
Itinerary Display in tabular form	TC5 Data representation variations	
Map-based itinerary display	TC5 Data representation variations	
Alerting by e-mail	TC1 Common/Similar Real Time alerts TC2 Itinerary regular updates	
Ticket availability check	TC7 Communication with external systems BC2 Companies Pricing Policies	
Online ticket booking	TC7 Communication with external systems IC2 Difficulty for cooperation between transport data providers BC2 Companies Pricing Policies	
Provision of web links to booking systems	TC7 Communication with external systems IC2 Difficulty for cooperation between transport data providers	

Table 2: Potential system functionalities grouped by level of importance and associated technological (TC), institutional (IC, and Business (BC) constraints

1.3.3.2 System architecture

The determination and analysis of the user needs as well as the review of existing journey planners that indicated the prevailing technical, business and institutional considerations and constraints were the main inputs towards the definition of the complete functional and data architecture of the WISETRIP system. Taking also in mind the project timescale and budget a set of desirable and applicable system services have been determined, and the relative workable architecture has been agreed.

The **WISETRIP Architecture** has divided the system into three fundamental layers.

- **1st Layer - Participating Services and Source Data:** These are the existing systems (i.e. journey planners or booking systems), external information and services (i.e. time, user position, external alerts) as well as the data environment including personal user data related to trip selection and user preferences.
- **2nd Layer – Main System:** It contains three main modules, a) the journey planning module (WISETRIP Core System), the personalization module (WISETRIP Real Time Decision Module - RTDM) and, on top of them the services module. The final journey plan is produced by the Core System and is handed to the Services for delivery or to the RTDM for further processing. Other sub-systems refer to interfaces with the other layers or data sub-systems. The WISETRIP Platform is interfacing to the 1st layer: a) The Core system interacts with the participating Journey Planners and b) the RTDM - Personalisation System interfaces with external information sources, and process the relative data as well as user relative data and profile. The Services of the WISETRIP Platform are communicating with the devices of WISETRIP (3rd layer) through the intermediate 'Devices Interfaces Layer' that takes care of the open & harmonised interconnection to various devices. Knowledge of the platform includes a) data (geography, destinations, means, and terms) about participating transport networks (that are presented through the participating journey planners of the 1st layer) and b) trip cycle model that is being used in order to build the personal trip life cycle data of each traveller (1st Layer)
- **3rd Layer – Distribution:** We call 'distribution' the function of providing the information and service to multiple users through various technological devices. The main role here belongs to the devices and the user interfaces running on top of them.

These three layers are illustrated in the figure below:

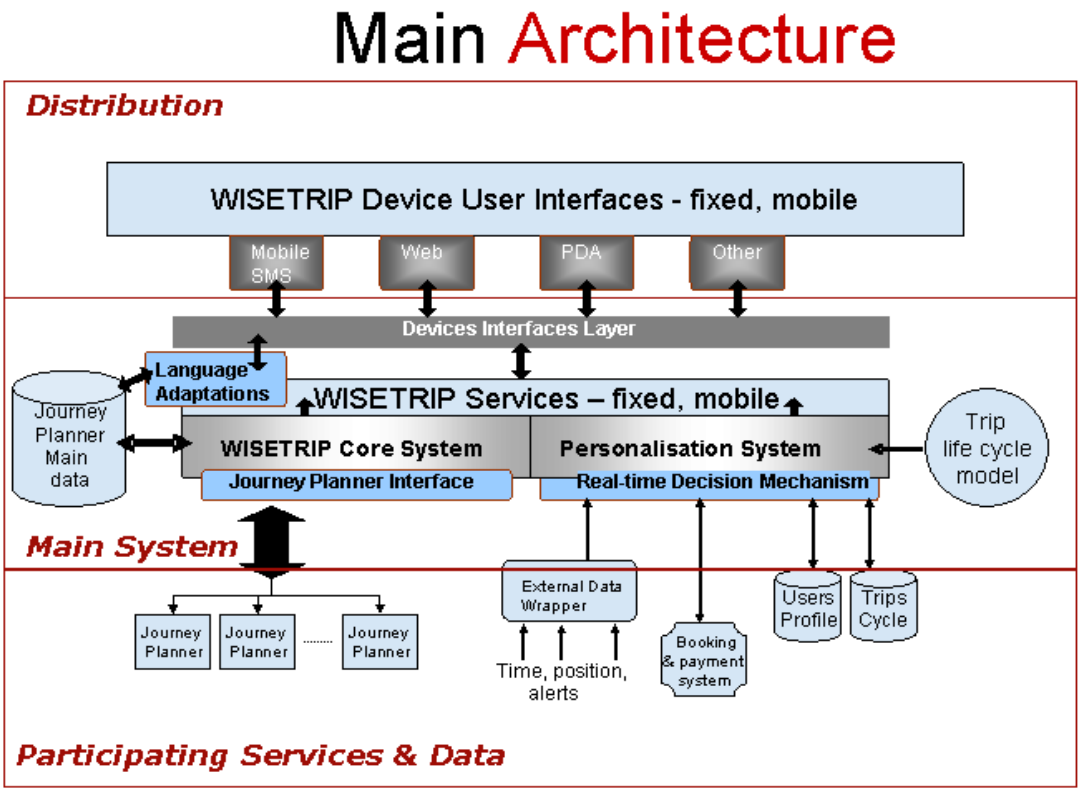

Figure 17: WISETRIP Main Architecture

To summarise, the overall system consists of a number of task-oriented components that are logically grouped into four major functional components/subsystems: User Interface, WISETRIP

Core, WISETRIP Personalisation and Participating Journey Planners. Each of them is a relatively independent part of the architecture and each one has its functional scope, role and responsibilities on the overall system. Depending on their attributes they dynamically collaborate to support various uses cases and workflow scenarios. D2.2. "WISETRIP Architecture and Data Model", presents in detail a) a reference model architecture that describes the way the WISETRIP journey planner (Core System) is composed from other journey planning systems, the communication layers, the functional role of the decision mechanism & adaptation modules that are involved (trip life-cycle manager, personalisation data & user profiles and information adaptation and distribution gateway), and b) the general methodologies, concepts, data architecture and data requirements, functional modules and ideas, as well as the tools and technologies that will be used to build up a fully functional prototype of the WISETRIP system.

1.3.3.3 System implementation

1.3.3.3.1 Journey Planners' Adaptation Interface

Currently five Journey Planners (Enosis from Greece, Journey.fi from Finland, Traveline North East and Cumbria from UK, BusBussola from Italy and Hangzhou JP from China) are connected with WISETRIP system, providing routing information for interurban or even urban trips within their areas of metropolitan, regional or national scale. WISETRIP Consortium has assured the continuity of the existing connections with the participating JPs and additionally is trying to attract and invite as many as possible new JPs to participate.

The development effort for the connection of a JP is minimal (it has been estimated at about one person-month). The fundamental condition for a connection with a new JP is to be able to provide reliable routing information for a city (or even better for a metropolitan region) or a nation. From that point on, the JP has to establish a simple communication interface with WISETRIP so that it can provide partial trip responses to WISETRIP queries. It has to be mentioned that the established interface:

a. is light enough and do not impose heavy loads or require extreme system resources from the Journey Planning engines

b. is generating typical trip requests to the system, which is the typical job and role of the Journey Planner.

WISETRIP coordination office is providing a Technical Guide for JPs who are willing to be integrated. The documentation guide presents the data requirements and the corresponding web services that should be implemented by each JP. More technical information and guidelines can be provided upon request, but in short the mandatory connection & operation requirements for a JP include:

- Data requirements: The JP has to uniquely identify each node within its network and the international gateways in its network. Moreover the JP has to identify the supported transport modes and the names of operating companies and the relative means. The above data have to be provided in at least two languages (the language of the nation that JP is established and English)
- Services requirements: Three (3) basic web services have to be provided by participating Journey Planners to the WISETRIP system:
  - Node Validation: validates a specific node within a Journey Planner's network. If the requested node is valid a flag indicating validity is raised. Otherwise a list of proposed alternatives is retrieved;
  - Find Trips: returns all combinations of trips from a specific Journey Planner from origin to destination
  - Get International Nodes (gateways) for each Node: returns all associated International nodes for a specific Interurban node from a particular Journey Planner. A list of International nodes is retrieved.

Besides the above mandatory requirements, a Journey Planner could optionally provide more data and support the relative added value WISETRIP services. Such data are: coordinates (of WGS 84

type) for each node, Real time information about incidents for a specific trip segment, and Ad-hoc services such as: booking services and estimated prices for trip segments, weather info, environmental info or any other information related to a node or a segment.

In order to achieve maximum interoperability between WISETRIP and the participating Journey Planners, the project development team has defined an xml schema (WiseTripWeb). The xml schema has been designed to meet all the above mentioned requirements (mandatory and optional). WiseTripWeb is a common protocol that should be followed by all participating Journey Planners; however adaptation layers can also be implemented if required.

1.3.3.3.2 Traveller Specific (Personalised) Services

The WISETRIP Personalisation System performs journey planning functions and procedures according to the user's profile and trip cycle criteria selected by the user. It detects the information that must be sent to each user, processes alerting messages, produces notifications or reschedules a specific trip segment when necessary and inform the user when a specific trip has been broken.

The idea is that the WISETRIP user registers in the system and creates his/her profile, giving personal details (e.g.: full name, e-mail, phone number etc.) and declaring preferences on transportation modes, services he/she wants to subscribe, type and occurrence of notifications to be received, etc. For each specific trip the user is interested the following services can be provided via email and/or via SMS.

- Notification on disturbances: the system gets real time information - either by a Journey Planner, or by another traveller- about a trip segment disruption or delay, and creates and sends a notification message to all users whose registered trips contain the affected trip segment.
- Trip Redesign: If needed or requested the system provides the user with a list of existing alternatives to a trip segment that can't be accomplished or has been disrupted.
- Validate Trip: The system periodically validates one or more scheduled trip segments and notifies users in case of changes.
- Real time (during the trip) interaction of the traveller with the system: Using this service the user will be able to inform the system about a trip segment disturbance and/or provide his/her current position declaring a delay in his/her schedule.

The above mentioned services are indicative. An extensive set of personalised services has been defined, implemented and provided by the WISETRIP System, always with the users' acquiescence.

Trip Life Cycle Model - The personalisation system takes into account the different periods of registered trips (trip – specific life cycle data) that constitute the Trip Life Cycle Model (Pre-trip phase, En-route phase and other phases of a journey). Based on these data the decision module builds up a time table with scheduled events and notifications for each specific trip, according to which up-to-date information is 'pushed' to the user, when relevant. Information is analysed and according to the trips cycles the Real Time Decision Module (RTDM) sets of one or more notifications for one or more users.

The Trip Life Cycle manager is identified as a separate component, part of the RTDM, and also includes functions related to the definition of personalised data (profile definition function, trip selection, etc.).

Real-Time Decision Module - RTDM is the kernel of the Personalization System layer. This module is based on events. It communicates with the other modules and layers of the WISETRIP system via web services. The communications flow between RTDM and the other modules in WISETRIP is bidirectional.

One of the main functionalities of the RTDM is to manage and monitor all the active trips of WISETRIP. To achieve this, each trip has its own trip management process: every time an active trip is detected (at RTDM start-up or when a new trip is created) a new TripManager object is created for managing the trip. This manager will control the whole life cycle of the trip, generate a list with relevant scheduled and unscheduled events and define when and how to send each notification message. Figure 18 illustrates the sequential actions carried out by the TripManager object

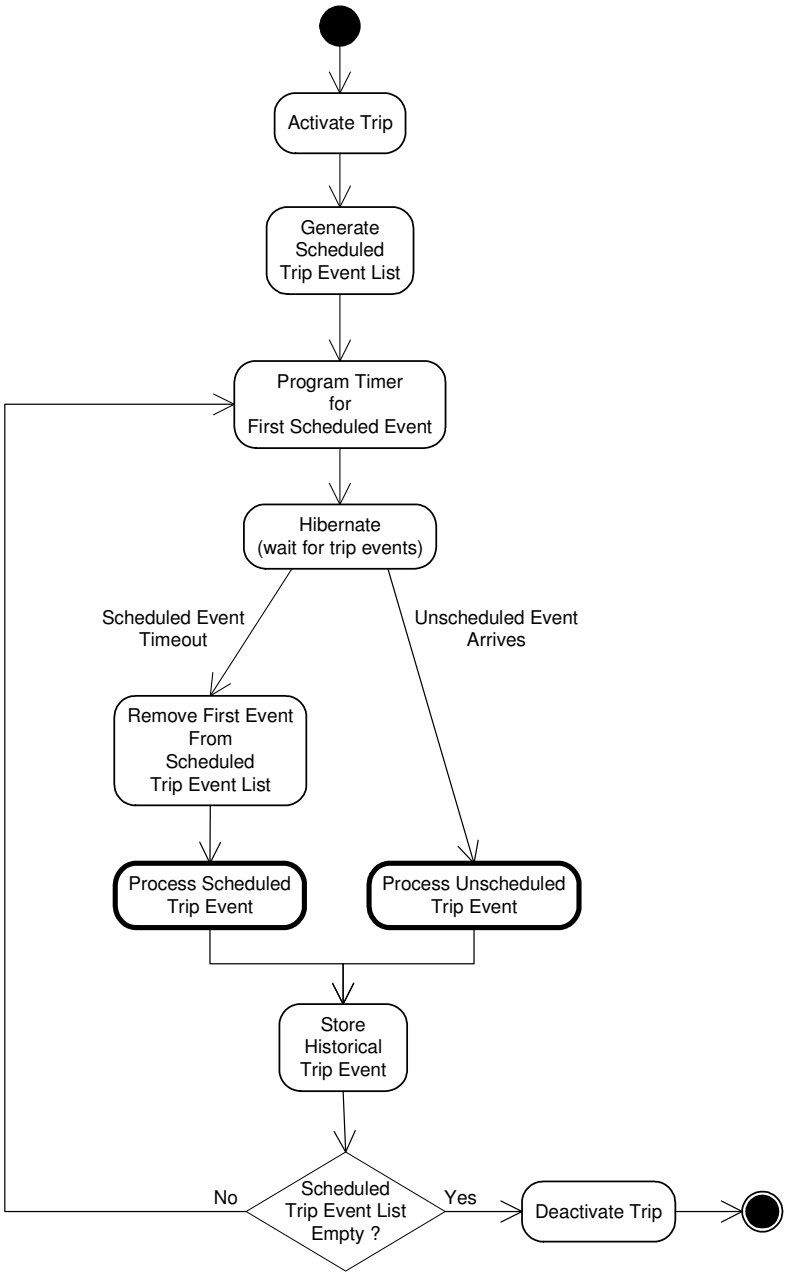

Figure 18: Real Time Decision Module (RTDM) – Trip Manager Object

Another characteristic of the RTDM module is the possibility that gives to the user to subscribe only to those services the user is interested in. This information will be defined by the user at the beginning of the process –when he is selecting a trip- and will be able to be modified by him/her during the whole life of his/her trip.

In order to develop a flexible and adaptable system, WISETRIP RTDM has been designed to work with events. Therefore, the RTDM keeps track of the life cycle of each Trip by creating and manipulating different types of events. The advantage of using this kind of system is obvious when we consider the possibility to add new functionalities to the system in the mid-term future.

As mentioned before, RTDM manages several types of scheduled and unscheduled events. The following list presents two types of scheduled and two types of unscheduled events that can occur in a trip-life cycle and the way they can be processed:

- **Scheduled Notification (scheduled event)**: This event is used for sending a text message to a traveller using a phone number or an e-mail. It is generated by the service subscriptions of the trip.

- **Segment Validation (scheduled event)**: Segment validation is carried out for checking if a given trip segment is still scheduled by the JP that originally provided it. If the validated segment remains as originally scheduled, then no action is needed. In the case the validated segment is no longer scheduled as was originally provided, the changes and disturbances produced in the relevant trips have to be checked.
- **JP Segment Disturbance**, **Trip Segment Disturbance**, **Trip Traveller Position (unscheduled event)**: These three different types of events have in common that they notify a disturbance in one of the scheduled trip segments or in the expected traveller position. In these cases the possible consequences of these events have to be evaluated.
- **Trip Modified (unscheduled event)**: This event means that an existing trip has been modified or that a new trip has been created. It is also possible that the real-time options of the trip have been changed. In any of these cases the Trip Manager will reload the trip information from the database and will recalculate the list of scheduled trip events.

1.3.3.3.3 Open Layer for Interface Development

User interface is strongly influenced by the fact that WISETRIP services must be accessible through different fixed and mobile user devices. In order to reach the widest possible target audience, specialized front-end interfacing mechanisms have been developed capable of delivering content for multiple devices. More specifically, currently three such mechanisms are available: a web interface (web portal), a native application that can be installed into any mobile device running Windows Mobile Professional operating system and a mobile interface suitable for iPhone Safari browser

However, these interfaces need to handle interaction with the user in a way that is consistent across various types of end devices. Therefore the idea is that depending on user's device capabilities, WISETRIP system functionality can be extended by plugging new user interface components with the form of add-ons that will not affect or impact the overall WISETRIP system. **In other words, an open, extensible and customizable user interface system has been designed, where each pluggable user interface component can consume functionality offered by other components in a controlled and determined manner through service-oriented interfaces.** More specifically:

The information requirements of User Interface are exposed by the WISETRIP Core with the form of well defined service interfaces (web services). Such services include the authentication of the User, the trip finder service which is initiated by the User Interface in order to obtain trip info for the end user, the node validation service which identifies trip nodes, the user profiling services and many others. Moreover, User Interface interacts with Personalisation System to request specialised trip services, such as notifications on disturbances, trip redesign, etc., expressed again with the form of web services. An xml schema (WiseTripWEB) and the relative wsdl have been defined supporting the provision of all available web services in a uniform and open way. User Interface acts as the consumer of these web services creating client stubs that shield network infrastructure diversifications, while also using address identifiers known as endpoints to locate these services. These services are available under a known set of credentials to prevent unauthorized disclosure.

This loosely coupled integration between WISETRIP Core, Personalisation System and User Interface promotes flexibility that is crucial in the system due to the large diversity presented in the User Interface components. The high degree of independence imposed by web services between components, allow the replacement of components, or even their change without having to apply reflective changes. Therefore User Interface can be extended with new components that integrate new technologies allowing for seamless transition of enhanced functionality to the system (in the form of add-ons) by exploiting the existing functionality of the underlying service. In line with this notion, the three front-end interfacing mechanisms implemented are using the one and single wsdl providing either the whole set of available WISETRIP web services (WISETRIP Web portal) or part of them (WISETRIP Mobile Application and mobile portal).

1.3.3.3.4 Performance

In parallel with the implementation of the WISETRIP System components laboratory testing took place for the assessment of the technical performance of the various functionalities and services of

the system. Any discrepancy of the system performance from the standards set by the developers (based on functional specifications or users requirements) initiated a process for refining and fixing the functions/services creating the degradation of the system performance and thus leading to a technically reliable and robust system.

The technical assessment of the system aimed at verifying the integrity, stability, and computational time efficiency of the functions and services comprising the WISETRIP system. The assessment of the system functions was based on measuring and assessing their performance under 37 technical indicators grouped into three categories:

- technical reliability indicators assessing the robustness of the system functions,
- information consistency indicators assessing the capability of the WISETRIP functions to provide consistent alerts and trip itineraries to users, and
- response time indicators assessing the computational time required by the functions to process requests.

The technical assessment of the WISETRIP services was based on assessing 20 indicators grouped in two major categories:

- technical reliability indicators assessing the robustness and integrity of the services offered by the system, and
- time efficiency indicators assessing the computational efficiency of the time-critical services.

The assessment of the above indicators was performed through the analysis of the data collected from a series of lab trials of functions. Hypothesis testing was performed in order to validate the technical reliability and response time efficiency of the functions and services implemented.

Detailed information about the data collection and analysis process for the technical assessment of the system and the associated results can be found within Deliverable D7.3 Assessment Report. In short, the data analysis for the technical reliability indicators proved that the system functions and services respond to requests providing consistent information, with a minimum success rate of 98%. Regarding time efficiency indicators the data analysis shows that the computational time for processing alerts was negligible (less than 5 milisec), while the time required for itinerary planning was estimated to 57 sec under a medium level operational workload.

It has been verified that the system offers an exhaustive list of alternative feasible itineraries for any trip request, created by combining intermediate itineraries provided by the participating journey planners. In this context the average estimated time of 57 sec required for an itinerary planning is considered as an acceptable time (comparing also with other trip searching systems). However, the time requirements for responding to a trip request, consist of time components which are beyond the system's control (i.e., computational time of the participating journey planning, and workload of the communication network) and occasionally become the reason that increase the above figure (with a maximum recorded time at 130 sec). In this context, WISETRIP developers in close cooperation with the participating Journey Planners tried to optimize times relative to nodes validation process and data transfer. Moreover, trips caching is activated under certain circumstances and in this case itinerary planning response time is limited to 1-2 ms.

1.3.3.4 Use of WISETRIP Platform

After laboratory testing and system refinement WISETRIP prototype became stable and reliable enough, ready for real-life demonstration. Demonstration was accomplished in two stages: the Pre-demonstration phase and the Public demonstration phase. The whole demonstration period lasted about six months from middle May to end of November 2010 and took place at five validation sites: Finland, Florence/Livorno (in Italy), Greece, Hangzhou (in China) and UK.

Pre-Demonstration Phase was carried out by a panel of professional testers (The Focus Group), aiming to test the capabilities and user acceptance of the WISETRIP platform and services in a controlled environment, and to derive useful indications and feedback from the trials that may help in consolidating the system functionalities and services before starting real-life public user trials. It was carried out from middle May until middle June 2010 with a duration of about four weeks. In this

phase, the sample of the WISETRIP users was limited and included about 40 selected professional testers (Focus Group). The members of the Focus Group were trained and provided with an information package, including user guide, summary description of journey planner at each demonstration site, testing requirements, etc. They tried and implemented a number of journey planning trials and use of WISETRIP services in order to get elements and judgements necessary to assess the capabilities and usability of the system and then they were asked to complete relative user acceptance questionnaires, dealing with: Information Quality, User Friendliness and Expected Journey Planning Effort Reduction. The total number of filled questionnaires received was 27. In addition, a number of comments and proposals for improvements have been received. Based on the results of Pre-demonstration Phase, the WISETRIP Platform has been updated and improved. In particular, the following aspects have been addressed in the system adaptation process:

- Bugs fixing related to "Trip saving" and "Excluding Transport modes" functionalities as well as to timezone management ,
- Additional functions for mailing and printing of planned itinerary has been added.
- Additional information on walking segments has been provided.

After updating the WISETRIP platform, the second phase of the demonstration started middle July and completed middle November 2010. The demonstration phase aimed to demonstrate and evaluate the WISETRIP services in real-life conditions involving a large number of public users. The purpose of this phase was to extend the Pre-demonstration user acceptance evaluation and assessment, addressing the following main assessment categories:

- User Acceptance, aiming at assessing the non-functional features of the system from the users' perspective;
- Willingness to Pay, aiming at investigating the potential users' willingness to use the system under various types and levels of charges.

About 2.700 users visited the WISETRIP web interface and 608 from them filled questionnaires addressing not only users' acceptance but also their willingness to pay for the WISETRIP system and its services. Collected questionnaires were analysed and the evaluation results are presented in section 1.3.3.5 below.

Although demonstration phase has typically ended, users are continuously visiting the web interface and it is indicative that until today there are more than 16.300 page views (about 4.000 trip searches).

1.3.3.5 Evaluation Results

Apart from the Laboratory Testing and the technical assessment of the system functionalities and services (see section 1.3.3.3.4), WISETRIP Evaluation process contained also two supplementary types of assessment:

i) User acceptance assessment aiming at exploring system performance from users' perspective, and

ii) Willingness to Pay assessment for specifying the users willingness to use the system under various levels of charges. An evaluation plan was developed (presented in Deliverable D6.1 "Evaluation Plan") providing the types of assessment, the evaluation indicators, the methods of measuring and assessing the indicators, the associated experimental design, the data collection instruments (i.e., questionnaires and data collection templates), and the overall evaluation management plan.

The User Acceptance assessment aimed to: i) assess the non-functional features of the information services including clarity and sufficiency of the information provided, and ii) explore the impacts of the system in the cognitive effort and the time required for journey planning and the travellers uncertainty during the execution of a trip. In particular, this type of assessment was based on users ratings provided for a set of metrics for the system performance grouped into the following categories:

i) clarity of information offered,

ii) insufficiency of information provided,

iii) user friendliness of services,

iv) impacts on the users' cognitive effort for journey planning,

v) time required for journey planning, and

vi) impacts on the travellers uncertainty.

The analysis of the ratings collected under each user acceptance metric were analysed by estimating the median and performing a Sign test for specifying the lowest value for the actual median. As mentioned before the assessment of user acceptance of the WISETRIP system has been performed in both Pre-demonstration phase, and the Public demonstration phase. Similar results emerged in both stages. **Error! Reference source not found.** below presents the median for each of the above metrics in each country.

		Median Metric Value per country				
Metric	**Range**	**UK**	**Greece**	**Italy**	**Finland**	**China**
Clarity of information	1 – Not clear 2 - Clear 3 – Very Clear	3	2 -3	2	2	2-3
Information sufficiency	1 – Not Sufficient 2 – Sufficient (but additional information is needed) 3 – Sufficient	3	2	2	2	2-3
User friendliness	1- Very Poor 2 - Poor 3 - Moderate 4 - Good 5 – Very Good	4-5	3-4	3	3-4	4
Cognitive effort reduction	1 - Substantial Aggravation 2 - Minor Aggravation 3 - Equivalent 4 - Minor Reduction 5 – Substantial Reduction	5	4-5	3-4	3-4	4
Time requirements for journey planning	1 - Substantial Aggravation 2 - Minor Aggravation 3 - Equivalent 4 - Minor Reduction 5 – Substantial Reduction	5	4-5	3-4	3-4	3
Travellers uncertainty reduction	1 - Substantial Aggravation 2 - Minor Aggravation 3 - Equivalent 4 - Minor Reduction 5 – Substantial Reduction	5	4	3	4	5

Table 3: Results of user acceptance assessment

Based on the above results user acceptance assessment confirmed that the information provided by the WISETRIP services (trip itineraries, notifications, and alerts) is clear and sufficient. The interactions of the users with the system services was found user friendly while the system was expected to reduce the time and cognitive effort requirements for journey planning. In addition the system applications were expected to reduce the travellers' uncertainty during the execution of their journey.

The objective of the assessment of the willingness to pay, was to explore the willingness of various categories of users to use the services offered by WISETRIP under alternative levels of charges. A Stated Choice model was developed and calibrated in order to assess the response of the users to alternative levels of charges attributed to the WISETRIP system. The implementation of this type of

assessment has been performed through conducting a Stated Preference Survey throughout two European countries (Greece and UK) and China during the Demonstration phase of the project. A major finding from the Willingness to Pay assessment of WISETRIP, is that a substantial percentage of the potential end-users are willing to use the system services for a charge of €0.8 per trip. This percentage of using WISETRIP differs among the sites and additionally users' willingness to pay is elastic with respect to the levels of charges. The **Error! Reference source not found.** below summarize the choice probability (expressed in percentage) of using WISETRIP at the sites for which valid results emerged.

			UK	GREECE	CHINA
WISETRIP Charges	**0.8 €**	WISETRIP	92.2%	80.9%	80%
		Non-WISETRIP	7.8%	19.1%	19%
	1 €	WISETRIP	29.1%	33%	63%
		Non-WISETRIP	70.9%	67%	37%
	1.2 €	WISETRIP	1.2%	5%	41%
		Non-WISETRIP	98.8%	95%	58%

Table 4: Choice probabilities of WISETRIP/Non-WISETRIP alternatives for various alternative levels of charges per trip, based on the responses collected in UK, Greece and China

Based on the details of the analysis of the willingness to pay, it was verified among the attributes of the WISETRIP system, cost was found to be a statistically significant parameter in the models developed for UK, Greece, and China. The coefficients of cost in all three utility function formulas were negative implying that the increase in the price of WISETRIP services has a negative impact on the potential users utility (i.e., the higher the charges of WISETRIP services the less likely it would be for the users to use them). Among the characteristics of the respondents, only Travel Frequency was found statistically significant in all sites. The corresponding coefficients were positive in all three models implying that Travel frequency has a positive impact in the WISETRIP utility perceived by the potential users (i.e., the more frequently a potential user travels abroad the more likely is to use WISETRIP).

The above results from the analysis of the willingness to pay provide useful input for projecting revenues for the WISETRIP system, taking into account the level of acceptance of the system encountered within the various users groups identified within the analysis. Although exploring the options for setting up a viable business model for operating WISETRIP is beyond the scope of this document, the results provided through the analysis of the willingness to pay, indicate that the proposed system has a potential of economic sustainability.

1.4 Potential impact and main dissemination activities and exploitation of results

1.4.1 Socio-economic impact and the wider societal implications

This project has confirmed the wider benefits that integrated door-to-door integrated journey planner can offer to citizens. Topics of particular significance in terms of their impact are enhanced 'intermodality', 'door-to-door', 'on-trip, adaptive and reactive travel information through mobile applications.

In the longer term the outcome of WISETRIP should contribute to improving the EC economic position: it enables business travellers to plan their journeys more efficiently, thus leaving more time available for work and achieving more efficient management of uncertainty, stimulating tourists to explore new places, resulting in regional economic growth and contributing to resolving the crisis caused by extraordinary conditions such as strikes, extreme weather and nature conditions (i.e. strong winds, floods, volcanic ash), by providing alternative routes and means of transport. Efficient spread of knowledge – on available solutions for a redesigned trip - within situations of crisis, will be the key to avoid tiring situations by enabling more efficient reaction based upon the quicker response to the user need. Similar benefit and positive impact is expected when changes in schedules and/or

vessel assignment is well-known to the user. **Efficient traveller awareness across unexpected conditions and trip changes is the major impact of WISETRIP.** The use of WISETRIP by European travellers (or visitors of Europe from other parts of the world), as a trip planner and personal trip assistant, can make travelling more straightforward and change management will be much easier to accomplish. Avoidance of tiring situations within European travel is among the most important impacts that should be created. The fact that the project has wide European exposure, through the participation of many countries, transport operators, journey planners and industrial partners with an international partnership and customer base has enabled the project to reach a wide audience. In the future, its potential presence within the most popular and leading mobile devices of the world (Handheld and in-vehicle) can boosts its use within EU and worldwide

Moreover, the involvement of multiple types of criteria within the trip decision and trip redesign process allows the availability and promotion of many traveller scenarios, giving emphasis to public transport within urban areas. It is common that the traveller is not aware of the feasible and cost-effective means to move within the urban edge of an international trip. **Linking urban ways with international railway/airline/ferry trip through WISETRIP is a means to promote public transport**; a necessary promotion towards transport with less CO_2 emissions and aiding modal switch.

Overall, WISETRIP has contributed to the acceptance and use of integrated traveller services. Citizens' knowledge on local, regional and national journey planning systems might be poor, especially to the need of the international traveller. **WISETRIP service links many journey planning systems and real-time data providers, and brings them to the service of the international traveller. Henceforth, it widens their use and accelerates their positive impact to transport and mobility**. A consequence of WISETRIP role would be to push Journey Planners into enhanced visibility and motivate them to increase their quality in respect to the availability of real-time information.

WISETRIP is also contributing to the realisation of various EU-Policies with respect to sustainable transport. For example, the project is relevant to the European policy on mobility and sustainable development as recognised in the Mid-term review of the European Commission's 2001 transport White paper, *Keep Europe Moving*[5]: to disconnect mobility from the adverse effects of mobility. In other words, the promotion of new technological innovations, a shift towards the least polluting and most energy efficient use of transport modes - especially in the case of international travel - and co-modality. The EU has published a Green Paper on Urban Transport to identify potential European added value to action at local level. The results of WISETRIP can be used to enhance research, measures and objectives in making urban mobility more sustainable.

[5] Keep Europe Moving, Sustainable Transport for our continent, Mid-term review of the European Commission's 2001

1.4.2 Main dissemination activities

WISETRIP dissemination and promotion activities have been designed to address and meet the main project objectives of promoting journey planner services and achieve the largest possible resonance of project results in order to favour large international dissemination and take-up of the approach after the end of the testing phase. Basically, two main dissemination and promotion levels have been identified: a Local and National dissemination level and an EC and International level; the two levels have moved in parallel during the project development. The first level has represented the immediate field of dissemination and promotion activities for both project and post-project phases. Fundamental to the success of the WISETRIP action was in fact to gain interest, involvement and trust of all concerned users in local pilot sites and in the surrounding territory linking the national levels. At second level, WISETRIP was presented in European and International events favouring the adoption of good solutions and good practices identified in pilot project sites in other EC and non- EC countries. At the same time WISETRIP has established important relationships with other EC projects and with researchers, Authorities, developers and operators involved in the field tackled by the project. In fact, one of the main channels to disseminate the results and receive feedback on the force of the project has been the formation of an External Users Group, including Users, Traffic Managers, Public Authorities, Transport Operators, Equipment Manufacturers, Service Providers, Application and Service Developers and research organizations, or other relevant actors. This user group includes 58 members coming from EC countries and also from Australia, China and USA. From the overall point of view, WISETRIP dissemination and promotion activities have involved a coordinated set of instruments and tools, with a mix of regularly timed actions and asynchronous activities:

i. The well-design of the **WISETRIP project logo and general image**, in order to show fast the purpose of the project and attract the interest of people. The main elements characterising the logo design include a clear view of the project acronym, a graphical reference to e-Journey Planners and a focus onto international traveller needs. The logo was part of each dissemination material;

ii. The build-up of the official **WISETRIP public Website**. The site aims to promote the public image of WISETRIP and attracts, as for the logo, the interest of people, in particular the interest of world-wide travellers informing on the new possibilities and project innovations for them, and the interest of stakeholders like local Authorities. It is composed of different sections, apart of the Home page; some project documents have been uploaded for free download (public deliverables, e-newsletters, presentations…). The WISETRIP website is accessible through the URL http://www.wisetrip-eu.org; the address is clearly indicated in all project dissemination material as well as linked to other public websites.

iii. Design and dissemination of project **Brochure and (e-) Newsletters**. A project brochure was designed at the beginning of the project, printed in 500 copies and distributed to all the partners for their local contacts and for distribution during the European and International events that partners attended. The project brochure is a core element of the WISETRIP dissemination strategy because it gives an easy to understand information on the WISETRIP project both for practitioners in the theme tackled by the project and for readers that have no experience with that. The brochure focuses on the project mission and approach and gives a summary of the core activities and targets, together with the project reference and contacts. Periodic (e-) newsletters have been issued during the project life-time and distributed by mailing lists by partners to wide European contacts. Each e-newsletter reflects the core image of the project and contains a summary of the project objectives, steps and results, at the different stage of the project development. In total the Consortium has circulated six e-newsletters. The Brochure and e-Newsletters can be downloaded by the WISETRIP public web site;

iv. **WISETRIP External Users Group**. The WISETRIP project has setup an External Users Group (EUG), including 58 members from 18 countries, being Journey Planners operators, transport operators, IT service developers and providers, public authorities, device manufactures, academic and transport research institutions, and other relevant actors. EUG has been regularly

contacted in order to notify about project's evolution and achievements and to receive relevant feedbacks and supports to improve the system;

v. A **project Workshop**. As a major dissemination channel, the WISETRIP Workshop "*A real time, multi-source and multi-modal personal trip planning service*" was organized on January 28th 2010 in Brussels, and hosted at the (Italy) Tuscany Region premises in one of the EC departments of the city. The workshops was targeted to city journey practitioners and public and private actors focusing on specific issues and innovations envisaged in the project. In fact the audience was composed mainly by representatives from public and private, research and commercial organisations from the wider area of transport. The workshop agenda was covering main issues related to the project, its progress and the demonstration phase, the challenges and concerns within the process of integrating variant journey planners, as well as recommendations for the future and concerns about the business perspective and feasible financial models. Besides WISETRIP, two more projects from the same research sector were presented in order to increase the good relationship among WISETRIP and other research projects and transfer good practices. In details one representative of the "START" project (financed by the European Regional Development Fund in the field of Transnational Cooperation Programme for Atlantic Area), focusing on Regional Journey Planner Interconnection and Web User Contribution, and a representative of the local Authority Tuscany Region for the "INFOMOBILITY" project (financed under the Regional Cooperation Programme in Tuscany Region, Italy) focusing on best practice case for supporting the better mobility and transport management and co-modality, presented their speeches. The level of interest received by the participants, the quality of the questions and the discussions, as well as the comments received from most of them, were the main benefits of this successful workshop. The overall presentations made by the speakers during the workshop can be downloaded by the project public web site.

vi. **Participation to National or International events** and exhibitions, presenting project approach and distributing the WISETRIP dissemination material. The project partners have participated to more than 15 events at National, European and International level. Some of the most important events can be here summarise as: attendance to the 10th International Conference on Application of Advanced Technologies in Transportation (Athens, May 27th to 31st 2008), 24th Philoxenia International Tourism Exhibition (Thessaloniki, October 29th 2008), I-TRAVEL project Workshop (Brussels, November 13th 2008), 15th World Congress on Intelligent Transport Systems (New York, November 16th to 20th 2008), 88th Transportation Research Board (TRB) 88th Annual Meeting (Washington DC, January 12th to 15th 2009), 16th ITS World Congress and Exhibition (Stockholm, September 21st to 25th 2009), 1st International EU FP7 OASIS Conference (Florence, November 4th and 5th 2009), 13th International IEEE Conference on Intelligent Transportation Systems (Madeira Island, Portugal September 19th to 22nd 2010), 17th ITS World Congress (Busan-Korea, October 25th to 29th 2010).

vii. **Research Publications.** Two (2) research papers relative to the foreground of the project were published: a) "A multi-modal international journey planning system: a case study of WISETRIP" taking part of the **proceedings o**f the 16th World Congress and Exhibition on Intelligent Transport Systems and Services (September 2009, Stockholm), and b) "Identifying Travellers' Information Needs and Services for an Integrated International Real Time Journey Planning System" taking part of the **proceedings o**f the 13th International IEEE Conference on Intelligent Transportation Systems (19th to 22nd September 2010, Madeira Island, Portugal).

viii. **Liaison with other projects**. WISETRIP has reached a very significant level of collaboration, in terms of exchange of know-how and possible follow-up, with other European projects and researchers: first of all WISETRIP and i-Travel project (www.i-travelproject.com) have worked together to join the two project purposes and to identify some concrete actions to be developed as it was the participation of i-Travel members to the WISETRIP External User Group; some useful contacts have come from the e-newsletters distribution, allowing, for example, the collaboration and exchange of information within the FP7 LINK project-forum (www.linkforum.eu), the transfer of good practices to the Consortium of the CIP-ICT-PSP In-Time project (www.in-time-project.eu) and to the EU VII FP CLOSER project (www.closer-project.eu). As a major contribution to the European cooperation, WISETRIP has transferred its

background and main results (i.e. WISETRIP Interface) to the START project (http://www.start-project.eu) co-financed by the European Commission's Transnational Cooperation Programme for the Atlantic Area and the START project, from the other hand, has provided WISETRIP with the city integration interface for the pilot inclusion of cities from Greece. Last but not least WISETRIP has also established an important communication link with the Tuscany Region (Italy), coordinating the Regional Infomobility project, in order to evaluate the possibility to enlarge the use of the WISETRIP platform to the wide regional area.

ix. The **link** to the Platform **on local Journey Planners Home page** as well as its presence on Facebook social network.

All the above dissemination activities are presented in the relative tables of Section **Error! Reference source not found.** of this document.

1.4.3 Exploitation of results

To achieve wide exploitation of WISETRIP results a two-fold approach should be followed consistently:

1. Continuation of system with the best possible advancements and with continuous geographic expansion should be assured.
2. Commercialisation of the service should be sought. In that context exploitation planning considerations that were analysed within the project framework, should be turned into a roadmap of actions.

System Continuity - One of the objectives set from the beginning of the project and highlighted with the utmost importance was to assure system availability and operation after the end of the project, in order also to be able to follow and plan its route towards expansion and productive operation, even commercialisation. In that context WISETRIP Consortium is willing to:

- **Maintain and operate all major software modules of the WISETRIP platform** (Core System – responsible for trip searching; RTDM Personalisation System – responsible for profiling and personalisation services; and front end interfaces – responsible for distribution and presentation of information and services at fixed and mobile devices) assuring that they will remain up and running.
- **Advance platform development and features based either on self funding or on a potential EC funding.** Based mainly on the demonstration and evaluation findings a set of advanced services has already be defined and planned to be implemented by the WISETRIP development team even after the end of the project. Development costs will be initially covered by self funding, while in the same the Consortium is exploring relevant Calls for Proposals to claim for further EC funding.
- **Continue dissemination activities**. WISETRIP beneficiaries are active in the areas of transport and tourism, participate in conferences, exhibitions and other events (either research or commercial) and have opportunities to continuously disseminate project results. Moreover, communication with the External User Group (EUG) that has been consolidated at the framework of the project will be kept active and extended to address also Journey Planners and Transport Operators.

However, it is clear that none of the above actions will keep the platform in operation if the Journey Planners will not provide their routing information. Therefore **WISETRIP Consortium has assured the continuity of the existing connection with the participating JPs and additionally try to attract and invite as many as possible new JPs to participate.** Action plan to achieve the above objectives has been set and is ongoing within the first semester of 2011.

About Exploitation - While system is operating and expanding, exploitation considerations have been addressed through the exploitation tasks carried out during the project. These tasks identified

the dominant actors[6] of the system and compared the variant feasible business models. According to the outcome of this work the alternatives exploitation routes for WISETRIP could be compliant to the following business models:

a) **A marketing entity model:** WISETRIP becomes a portal. Its power lies into a large population of visits. Revenues come from the advertisement and promotion of TOs and JPs or other destination based services. Hits, visits and placement of specific links should be billed according to a certain commercial policy.

b) **eTourism agent model (Agent Model):** WISETRIP becomes an electronic distributor, a sales channel of ticketing services. Henceforth it acts as an agent of cooperating transport operators or other ticketing sales organisation that offer an online ticketing interface to WISETRIP so that its user can buy tickets for the chosen services. WISETRIP receives a commission from the services sold.

c) **Subscription / usage based tariffing model:** WISETRIP is a value-added service provided to travellers. It provides online and continuous information for planned and registered trips. In that case, revenue is expected from usage. Registrations and/or messages might be charged under a certain policy that should be attractive and rational, remaining in accordance with the monitored willingness to pay. We can consider two different cases for the subscription model:

   - **End Customer Subscriber Model (B2C model):** The traveller himself is the user who registers and pays for the usage.
   - **B2B Subscription Model (B2B model):** The actual WISETRIP user is a travel & tourism office who acts for the traveller benefit. The tourism office can use the system to provide value-added service to improve customer relation.

d) **Combination of the above:** The selection of one of the three abovementioned exploitation directions does not mean that the WISETRIP provider cannot choose to combine two of them or even all three directions. The most obscure (as conflicting) combination will be the case for WISETRIP to be an eTourism agent selling tourism services and in parallel providing services to tourism professionals under the B2B case of Subscription Model.

Marketing	eTourism agent	End Customer Subscription	Subscription B2B
WISETRIP only acts as a marketing entity that bases its revenues on the advertisements and promotion of Transport Operators (TOs) and JPs or other destination based services.	WISETRIP uses the chosen trips and links their partial trip data to online ticketing services and/or other tourism sales. Commission fees are applied for ticket sales.	End users of WISETRIP services, do optionally register themselves, store trips and enable certain notifications. Usage can be done on a subscription basis. Payment corresponds to a certain, measurable amount of trips or messages.	Tourism professionals are the users of WISETRIP. They register trips of their customers enable certain notification plans. Usage is done on a subscription basis and payment corresponds to a certain, measurable amount of trips or messages.

Table 5 WISETRIP: Possible Business Models

[6] The WISETRIP actors include the WISETRIP Provider, the Journey Planners of various types either Multimodal – Urban, Metropolitan, Regional, National – or Single Mode – Corporate, International, National - , the Transport Operators, the Real-Time Data Providers, the Agent – Travel Office, the Agent Customer and the Individual Traveler

All models were compared in terms of risks to fail, extra development and investment needs, operation expenses. Outcome of this comparison led to the following conclusions as described within the next Table.

	Marketing model	Agent Model	B2C	B2B
Low User Acceptance Risk	High	Lowest	Highest	Low
Extra Development Needs	Lowest	Low	High	Highest
Marketing OPEX	Low	Highest	High	Lowest
Competition	High	Highest	Low	Lowest
CAPEX Investment Needs	Lowest	High	Highest	Low
Revenues	Lowest	High	Highest	Low

Table 6 Ranking the Business Model according to four different criteria

Though the exploitation plan described and compared four different business models, combination (merging) of models is feasible. **The combination of the agent model with the B2C model provides a promising field for commercial development.** The main reasoning for this combination is based on the following facts:

- B2C and Agent Models are both oriented to the end customer, namely the traveller.
- B2C model provides value-added service on top of the selected trip, which can be the purchased trips from the WISETRIP electronic agent. The two models supplements each other services.
- The two models share significant parts of the investment and operation requirements. These are the user support mechanism and the marketing activities.
- Integration with ticketing providers or other agencies makes the system more popular and the B2C service become more popular.

Therefore the merged model can include higher revenue forecasts without imposing costs upto the sum of the costs from the two models. The table below shows the items of investment and operation that are common and those that are associated solely to each model.

B2C only	Common	Agent Only
Development for Billing and Provisioning	Sales & Marketing Staff Marketing Activities User Support Mechanism System Usage load	Integration and Synergies with ticketing providers or other agents

Table 7: Common elements of B2C and Agent model within a merged model scenario

The problems faced when the Volcanic ash was spread all over Europe has resulted in interest from airlines and major operators within Europe. However, to become effective, WISETRIP should reach a mature exploitation stage. Each business model imposes different levels of investment while all of them require the system to be expanded at European and International level. Such expansion requires the integration of more Journey Planners and the inclusion of more real-time data and ticketing providers. The main problem faced by WISETRIP is the wide variance in the level and quality of information provided by national journey planning systems. Further research and development is required to broaden the number of Journey Planning systems involved and also to get full multi modal coverage provided in a consistent manner. WISETRIP also faced the problem of new technologies becoming available during the design phase. I-Phones and Android smart phones

were not known at the start of the project yet by the projects end these covered 90% of the smart phone market. Before WISETRIP can be taken to market greater partnership is required to bring mobile device, networks, operators and authorities into discussions and development. If this can be achieved the potential for WISETRIP is a global market.

A detailed analysis of the abovementioned issues is made within deliverable D.7.4 "Exploitation Plan". Additionally the deliverable provides a SWOT analysis for the four business models, analyses legal issues and details the desired advancement of WISETRIP functionality as indicated by the user assessment and the partners' study upon the trends of the market.

1.4.4 Project web site and contact details

The WISETRIP public website is accessible through the URL **http://www.wisetrip-eu.org.**

The homepage of the website is displayed in the following figure.

Figure 19: WISETRIP web site Home Page

The web site is the main public information source for the project. It publishes information about the project, its description, mission and objectives, current activities, publishable results and deliverables, news and media announcements and material. The contact details for the project are presented below:

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