### Project Presentation

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Abbreviations list
ACL Agent Communication Language
ADAS Advanced Driver Assistance Systems
B2B Business to Business
FIPA Foundation for Intelligent Physical Agents
GIS Geographic Information Systems
GPRS General Packed Radio Service
GPS Global Positioning System
IVIS In-vehicle Information Systems
LBS Location based Services
OS Operating System
OSGi Open Services Gateway Initiative
PAA Personal Assistant Agent
PDA Personal Daily Assistant
POI Point of Interest
PT Public Transport
RDF Resource Description Framework
SOAP Simple Object Access Protocol
UDDI Universal Description, Discovery and Integration
UI User Interface
VAS Value Added Services
WLAN Wireless Local Area Network
XML Extensible Markup Language
Executive summary
This document constitutes a short presentation of IM@GINE IT project. In it, a brief description of the workplan is given and the project’s main goals are listed. Furthermore, the technical approach to be used, the expected achievements and the expected impacts are included. Finally, the project economical data, the Consortium members and the Coordinator contact details are listed.
1. Project data
The following table summarises the project data:

<table>
<thead>
<tr>
<th>Contract Number</th>
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<td>Project acronym</td>
<td>IM@GINE IT</td>
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<td>Project Name</td>
<td>Intelligent Mobility AGents, Advanced Positioning and Mapping Technologies, INTEGRATED Interoperable Multi-Modal location based services</td>
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<tr>
<td>Programme</td>
<td>IST-2002-2.3.1.10 – eSafety of road and air transport</td>
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<td>Date of start</td>
<td>01 January 2004</td>
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<td>Duration</td>
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<td>EC Contribution</td>
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</table>

Table 1: Summary of project data.

The Project Coordinator contact details are listed in Annex A. The IM@GINE IT Consortium consists of 17 contractors from five countries (Annex B). A short project presentation (3 pages) is provided in Annex C. Through its User Forum initiative, the project intends to involve organisations from other European countries. Special attention has also been given to the diffusion of IM@GINE IT concept to the New Associated States, key actors of which will be invited to the project workshops.

2. Project main goals

IM@GINE IT facilitates the support of seamless travel throughout Europe. Through one and single access point it provides personalised, location-based, static and dynamic intermodal transport information, mapping and routing, navigation and other related services anytime anywhere in Europe. Thus, the key phrase behind IM@GINE IT is: facilitation of seamless and personalised travel in Europe.

IM@GINE IT delivers through various mobile devices, such as mobile phones, mobile PCs, PDAs and in-car devices as well as stationary PCs. A multi-agent system learns and recognises user preferences and guides the systems ambient intelligence and intelligent user localisation. A common data management module links the service to a wide range of contents. Besides information about tourist POI’s it supports travel by car, various inter-urban and urban transport modes, ship, airline and even airport facilities.

IM@GINE IT develops a common transport and tourism ontology for semantic web applications, centralised provision of integrated and dynamic services and an open interface to tourism and travel databases and information systems; all within a common, modular and intuitive concept.
Therefore, the main aims of the project are to:

- Cater for intermodality & seamless of travel. The mobility network is in reality seamless, thus IM@GINE IT should synthesise information of all modes, and of both urban and interurban environments.
- Bridge the gap between in-vehicle and off-board information and navigation systems and between vehicle and pedestrian navigation method.
- Be capable of collecting and managing data from different sources.
- Cater for interchangeability & seamlessness of communication technologies (access everywhere).
- Be able to “roam” between different media providers.
- Be capable of always acknowledging the location of the user wherever he/she is, thus switch between different positioning methods depending on the special requirements of the place or mode which the end user is.
- Be capable of navigating the end user at all levels (micro, within an airport for example, middle, within a city or area, and macro), and for the whole intermodal travel.
- Provide other related location based or travel oriented services, such as booking/ticketing and emergency services.
- Perform complex tasks on the basis of the user preference, and according to these preferences including automatic selection of best travel plan, intelligent filtering & synthesis of information & services, automatic change of travel plans according to unexpected events, booking and ticketing.
- Interface with external systems at the platform and/or the device point.
- Provide an external data editor, which allows to an external content provider to update and enhance a central IM@GINE IT database.
- Manage an intelligent HMI in order to provide services to the user optimized for the device resources. The HMI module on the basis of user work load, is responsible to filter or postpone some not priority events.
3. Technical approach

IM@GINE IT has to cater to the personal needs of the consumer in the following areas: “Being”, Knowing, Wanting, Acquiring, Enjoying. Formally, IM@GINE IT will cater for the needs of the consumer by providing information (‘knowing’) that permits a choice of services according to consumer preferences (‘wanting’), arranging for the remote booking of those services (‘acquiring’), facilitating trip planning according to user preferences (‘wanting’) through the provision of mobility information (‘knowing’), on-line booking and ticketing (‘acquiring’), in a way that ensures maximum comfort (‘enjoying’) and is customised to the consumer’s profile (‘being’). In essence this is a consumer value chain, i.e. the end user will identify value in a service to the extent that the service caters to his/her needs in at least one of the above areas. The formulation of the users’ objectives will lead to the cataloguing of a set of functional and non-functional requirements, per category, which by being clustered together, can define the scope and objectives of the IM@GINE IT system.

The overall architecture of IM@GINE IT is composed of the following main actors:

- the user;
- the service structure and the modality to access;
- the server side telematic platform, which manages content, services and user profiles;
- the device side application which hosts temporary users’ preferences, interaction with other applications and user interface;
- the infrastructure on the field.

The IM@GINE IT system will constitute a platform comprised of Data management, Web services, Intelligent Agents and Communication gateways. The platform should interface with Content providers, Service providers, GIS systems, Ticketing systems, Added value systems and Media providers. The platform will be able to:

- Obtain data from different sources.
- Provide a data editor to allow the input of data from external partner.
- Perform data synthesis according to specific requirements of transport modes and environments.
- Obtain external services.
- Perform service synthesis according to personal profile and user position.
- Geo-reference all data and services.
- Perform route referencing and logical localisation.
3.1 End-user devices

Today three different navigation methods are available: Off-Board navigation: all data on the device, On-Board navigation: generation of the navigation data on a server, Hybrid navigation: both. Navigation systems for vehicles are state of the art; what is still missing is a ready to use pedestrian navigation and an intermodal navigation system which helps the user finding the way from house door to house door. Especially problems with the hardware (GPS) still exist. Costs are too high and the integration of useful dynamic content is an open task.

On the device side four different local applications will be developed depending on the device’s type (mobile phone, PDA, in-vehicle, mobile PC; various sizes, OS, communication means, computing resources’ capabilities, etc.). In total the four types of mobile devices will provide the same core functionality, and therefore services. The differences between the four types have mainly to do with: a) their technical characteristics (for example operating system, user interface capabilities), b) the usability and context of use aspects (different usability for mobile phones and mobile PC, different context for in-vehicle device – driver – and different for mobile phones – pedestrian or PT user), and c) other local systems with which the IM@GINE IT system has to interface (for example on-board car navigation for in-vehicle device).
Picture 2: (a) In-vehicle information (source: Daimler-Chrysler); (b) Navigation via PDA (source: PTV); (c) Mobile phone based navigation (source: PTV); (d) Interface of Nomad device (PDA) to the in-vehicle system.

These variations in characteristics and possible impacts on the final service delivery will be assessed and analysed in the framework; however, would not affect the functions accommodated by the mobile device, and are envisaged to be as following:

- Local off-line applications, hosted in the device.
- Interface with the platform when appropriate (for example requested by the end user). Client-server as well as peer to peer communication is possible.
- Switch to different communication networks.
- Switch to different user positioning means.
- Automatic identification and adaptation to different operational environments (i.e. in a car, in a different transport vehicle – airplane, train, pedestrian, stand-alone).

The development in the market of mobile devices shows that we can expect the situation of having “all-in-one” devices in future. The market trend is clearly showing an integration process between mobile phone, PDA and GPS device. The next version of the NOKIA 7650 will already include the before mentioned functionalities. Due to more sophisticated end devices and higher data transfer rates in the wireless networks of the near future, pedestrian navigation and guidance will become attractive for service providers. Target user groups for pedestrian navigation will be tourists, business travellers and mobile work forces. Especially the latter group may be an interesting market segment for IM@GINE IT, as they behave like end users but the business model will be based on B2B.

3.2 Multi Agent platform description

A major trend in today’s electronic market is the development of applications and services designed to accommodate the mobile user and worker. In a mobile environment the user needs to access travel and recreational information in a wide geographical range or to be informed of events that may be of his/her interest, just with the use of a common cellular phone, a PDA device or through his/her car’s electronic systems. IM@GINE IT project intends to fulfil this need covering the whole travel chain providing personalized guidance and being Europe-wide and flexible.

The information sources are excessively distributed, owned and supported by different organizations with no common access standards. One of the IM@GINE IT special characteristics will be the development of an intelligent system based on agent technology that will integrate the existing information and services, adjust it to the
personal preferences of the user providing thus seamless services according to the user needs. An original combination of four agent types will be designed and developed, each dedicated to a specific task:

- the provider agents will provide simple services offered by simple service and middleware providers. Thus they will be able to perform ticket reservation, plan urban or intercity trips, provide tourist and traffic information
- the transport mode agents will assist the user’s travel depending on the mode that he/she will use (car, public transport or foot)
- the personal assistant agent (PAA) will work exclusively for one user, handling his/hers personal preferences and adapt the offered services according to the user needs. This agent type will aggregate the simple services provided by other agents in order to offer to the user the IM@GINE IT complex services
- the middle agent will participate to the localization of services proposed by different provider agents as well as to the transaction achievement between the PAA and the chosen provider agent.

Figure 2: IM@GINE IT Agents.

IM@GINE IT, developing a common router for data gathering and interfacing, a single batch of georeferenced and navigation services and a common, personalised user interface for info mobility services provision across the whole travel chain, significantly contributes towards a long-awaited dream to come true: seamless travel and tourism information coverage across Europe; based upon advanced, reliable and high quality dynamic services.
3.3 Scenarios of use
The main objective of IM@GINE-IT system is to support the user in satisfying his/her basic needs within the process of journey planning and trip support. Those user basic needs are collectively as follows:
- The user does not always know what and where the destination is (geographically).
- The user does not know the route & timetables to the destination.
- The user needs to make reservations.
- The user does not know the current transport status and situation.

Overall the system provides answers to the following questions in order to satisfy user's basic needs:
1. Where am I (in terms of location, POIs around me and transportation mean)?
2. Where is a specific PoI (or event/activity)?
3. How can I get there (multimodal route guidance)?
4. What is the itinerary (Public transport timetables)?
5. Is there availability of seats for PT transport modes?
6. Can I make a reservation?
7. How to pay & receive ticket?
8. Anything interesting along the route (positive events, extension of service)?
9. Anything interesting at the destination (positive events, extension of service)?
10. Any problem during the ride/trip (negative events, disruption of service)?

The following scenarios of use are therefore identified:
- Plan a new journey from origin, i.e. home (pre-trip).
- Plan a new journey while on trip.
- Plan a deviation to an existing trip.
- Bookmark or activate a planned journey.
- Ask for supporting services to trip execution (for example navigation according to planned route).
- See details of a bookmarked or active journey.
- Push events that may change the details of the active journey.

The complexity in fulfilling those scenarios of use, lays on two levels:
- The end user requirements may differ depending on user’s current transport mode (significant differences between private and public transport user), knowledge of the area, and of course personal profile and current location, among others. The IM@GINE IT system will support a multitude of services spanning the identified variations of requirements as well as parameters affecting those; at the end of the day the basic services will be adapted and customised according to transport mode, user mode (i.e. tourist, businessman, commuter, etc.) and preferences.
- The system should be able to cover multi-leg journeys, which may require a number of different modes, and most importantly at different environments (for example, a trip from city A to city B through city C, a trip within city B, a trip at the airport of city C and so on). The system should allow the user for planning a multi-leg journey consisting of many trips, and will acknowledge this series of trips as distinct instances.
The complexity of the task can be better explained through the following “story-telling:

A Finnish business traveler spends a few days for a short visit at PTV AG, and now wants to move from Karlsruhe (DE) to Desenzano (IT), on Lake Garda, for a two-day work meeting. The user is able to plan ahead for inter-urban travel, book ahead for the whole travel chain, and be updated in a multimodal travel context, while the system can support him automatically and pro-actively.

A couple of days before starting he plans the whole trip using his web-based IM@GINE-IT Personal Travel Assistant. The PTA already knows his personal preferences: 1st class train seat, use average-segment rental cars, business class seats on plane, etc. It contacts the involved content providers (Deutsche Bahn for train route calculation, InfoVoli (Flight Info) for airplane routes, Car Rental booking system, Hotel booking system, etc), joins the results and proposes an optimal itinerary, which is accepted by the traveler:

1st day
Karlsruhe to Frankfurt Airport by train
Frankfurt Airport to Verona Airport with an Air Dolomiti flight
By rental car to Desenzano to the meeting place
Overnight stay in a 3 star Hotel, beside the Lake

2nd day
Back to Verona Airport by car
Verona Airport to Frankfurt Airport with an Air Dolomiti flight
Back to Karlsruhe by train

Before leaving he “roams” (profile, itinerary, etc) on a IM@GINE-IT enabled PDA, which he carries along with him. On the first day everything goes well and the traveler manages to reach the meeting place without any disruption. When driving, he “roams” to the IM@GINE-IT enabled on-board device, which guides the traveler towards the meeting place. He has a very productive meeting, a delicious Italian dinner and a nice overnight stay in the beautiful hotel. When driving on his way back, after the second day meeting, the on-board car device warns the traveler that there is a traffic jam ahead on the A4 highway towards Verona and suggests an alternative route. The traveler isn’t worried: thanks to his IMAGINE-IT assistant being connected to InfoVoli real-time flight system, he knows that the plane departure has been delayed of 30 minutes. Back in Frankfurt, the PTA confirms that his train to Karlsruhe is 10 minutes late so he has just some spare time to stop for a tasty German beer.

3.4 Business elements
IM@GINE IT as a business entity aims at establishing a service network, in which the segmented value of contemporary ITS services (due to national borders and mode-dependent applications) can be aggregated, collated and then distributed evenly to business-to-business as well as business-to-consumers channels. As a result value can be added at all parts of the business chain, and contribute to a viable value proposition for all business players involved.
The “commodities”, as well as the specific value of each commodity and finally the business groups owing or providing each commodity are represented in the following figure:

**Commodities**

Content ➔ IMAGINE IT (server) ➔ Portal & Networks ➔ IMAGINE IT (client) ➔ Client devices

**Value**

Basic services ➔ Value added services (Aggregation, seamlessness, personalisation) ➔ Gateways ➔ Portability & Interconnection Access to services

**Business players**

Service & Content providers ➔ IMAGINE IT Consortium ➔ Portal & Network operator ➔ Mobile Device & Automobile manufacturers

Figure 3: The role of IM@GINE-IT business entity in the existing ITS value proposition.

In the above described chains all and each of the business players are involved in the service network in order to satisfy their business objectives and accrue increased benefits in return to their contribution. The following table provides a preliminary analysis of the IM@GINE-IT service network business elements.

<table>
<thead>
<tr>
<th>Role</th>
<th>Categories of players</th>
<th>Description</th>
<th>Value to the system</th>
<th>Value from the system</th>
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<tbody>
<tr>
<td>Service &amp; Content providers</td>
<td>Content sponsor</td>
<td>Owns, aggregates and provides content free of charge in order to promote its business and/or satisfy its customers</td>
<td>Content</td>
<td>Dissemination of content to increased number of end users</td>
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<tr>
<td>Content retailer</td>
<td></td>
<td>Owns or aggregates in order to provide it at a specific price</td>
<td>Content</td>
<td>Aggregation of content &amp; increased number of retailing channels</td>
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<tr>
<td>ITS service provider or operator</td>
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<td>Provides or operates basic or geographically dependent ITS services</td>
<td>ITS services</td>
<td>Personalisation of services &amp; increased number of retailing channels</td>
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<tr>
<td>Role</td>
<td>Categories of players</td>
<td>Description</td>
<td>Value to the system</td>
<td>Value from the system</td>
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<tr>
<td>Application service provider</td>
<td>Provides applications and services to portals</td>
<td>Application/services</td>
<td>Aggregation of services &amp; increased number of retailing channels</td>
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<tr>
<td>E-travel service provider</td>
<td>Provides basic or geographically dependent e-travel &amp; tourism services to portals</td>
<td>E-travel &amp; tourism services</td>
<td>Aggregation of services &amp; increased number of retailing channels</td>
<td></td>
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<tr>
<td>CRS</td>
<td>Distributes reservation/ticketing content &amp; services</td>
<td>Seat reservation</td>
<td>Increased number of retailing channels</td>
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<td>Portal &amp; Network operator</td>
<td>Private portal</td>
<td>Provides services to end users</td>
<td>Internet Gateway</td>
<td>Value added services (VAS)</td>
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<tr>
<td>Public portal</td>
<td>Provides services to end users</td>
<td>Internet Gateway</td>
<td>VAS</td>
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<tr>
<td>Mobile service platform operator</td>
<td>Provides services to end users</td>
<td>Mobile Gateway</td>
<td>Location based services (LBS), VAS</td>
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<td>Device manufacturer</td>
<td>Mobile device manufacturer</td>
<td>Manufactures mobile devices, and added value features on devices</td>
<td>Distributed functionality of the system on the device; enhances portability &amp; interconnectivity of the systems clients’ devices</td>
<td>Enhance LBS &amp; VAS capabilities of devices</td>
</tr>
<tr>
<td>Automobile company</td>
<td>Manufactures cars, and added value features within vehicle</td>
<td>Distributed functionality of the system on the device; enhances portability &amp; interconnectivity of the systems clients’ devices</td>
<td>Enhance LBS &amp; VAS capabilities of devices</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Preliminary analysis of IM@GINE-IT business elements and value proposition.

The success of the IM@GINE-IT service network, and respectively the viability of the above-described value proposition depend also on the sufficient number of players covering each part of the chain.

These issues will be further examined in the framework of WP8 of the project, and presented in D8.1.

3.5 Background/Foreground Technology
The IM@GINE-IT project follows-up the successful research results of previous projects in this area, in order to synthesise a “holistic” approach to ITS service aggregation and seamlessness throughout Europe. A long list of relevant projects exists but the most relevant are in particular IMAGE (Intelligent Mobility Agent for complex Ge-
The basic difference between these previous projects and IM@GINE IT is that the former are all **locally operated applications, restricted** thus to the locality of the available resources (i.e. content, services and networks), and not capable of **seamlessness in the use of these resources**. Although, IMAGE for example is able to interconnect with identical platforms cannot provide for real continuation of the service, and it is always attached to a specific source of data. Another tendency which should be taken into account is that of intelligent, user needs adapted systems based on intelligent agents, such as the ones developed by IMAGE & ADAMANT. These systems will continue to be deployed in Europe in the next years to come. IM@GINE IT can actually prove how this kind of available (but locally restricted, as mentioned) infrastructure can be utilised by a higher level multi-agent system in order to cater for service networking (i.e. exploit & network local infrastructures for developing a global service).

It is wrong to perceive that IM@GINE IT is going to be an extension of the previous systems mentioned above. Nevertheless, IM@GINE IT will use existing technology built in other projects with the aim to build a global, context aware, ubiquitous system that will eliminate the restrictions and limitations of previous systems.

### 3.6 Application sites

The verification and demonstration of the integrated IM@GINE IT will take place in a pan-European site, which interconnects 5 urban areas (covering micro - transport terminal, urban and/or interurban levels, depending on the occasion), covering in good balance Northern (Finland), Central (Germany), Southern (Italy, Greece) and Eastern (Hungary) Europe. Users from each pilot site will travel throughout European corridors, following routes that bring them alternatively across other sites and different content. The application scenarios cover all service environments (city, intercity, integrated), all types of modes within complex travel chains (car, bus, tram, metro, train, ship, airplane, airport facilities, touristic information) and all types of users ("average" user, social-recreation traveler, tourist, businessman, commuter, elderly). Finally, an intra-site test, having people traveling from on site to another (covering nearly all of them) will be performed, to test the offered services interoperability and roaming models.

#### 3.6.1 Pilot sites descriptions

- **Picture 3**: Tram in Budapest.
- **Picture 4**: Athens International Airport.
- **Picture 5**: Metro and train in Germany.
German pilot
The German pilot site covers the most important travel modes in order to plan a trip through Germany and Europe. The pilot site covers Germany and certain travel modes of other European countries (for example Flight database of whole Europe and Road network of Germany, Benelux, France, UK, Alps, Italy, parts of Finland and parts of Greece). The German pilot site aims to facilitate a multimodal trip planning including pedestrian, car and flight info via PDAs, mobile phones and in-vehicle device. Navigation with the on-board unit and eventually navigation with off-board unit (pedestrians) will be demonstrated. The user groups of special interest are: tourist, commuter and business traveller.

The German site will cover the following content:
- Geographic road network data and maps by PTV.
- POI by PTV.
- PT information on flights and trains by HACON.
- Dynamic Traffic information by PTV.
- Fuel stations by PTV and DC.
- In-door maps for Frankfurt International Airport including in-door POI by Fraport and PTV.

Depending on the interoperability of the client software, two different kinds of mobile devices are planned for the German test site: PDAs and mobile phones (smartphones). The following devices are under consideration: MDA II, Motorola E1000 Smartphone, HP iPAQ 5550 and Pocket Loox 720.

Furthermore the IMAGINE IT services will be accessed via in-car device. The German prototype vehicle will be equipped with the COMMAND on-board unit that is provided by DaimlerChrysler. COMAND is an acronym for “Cockpit Management and Data System”. This system is integrated as multimedia device and control unit in Mercedes E class cars. The COMAND system integrates audio (radio, audio CD, audio MP3 CD), video (TV, DVD), telephone, navigation, and map functions. In addition, a passenger is able to access external services using Mail/SMS and WAP by means of a GSM mobile phone.

Greek Site
The central point of the Greek pilot is the Athens international airport “Eleftherios Venizelos”, being the main gateway of business travelers and tourists into Athens and Greece. The Greek pilot will mainly cover the greater area of Athens, the city of Thessaloniki, as well as interurban public transport routes within Greece. The target groups of the Greek pilot are business travelers. Greek site has four basic scenarios:- Plan trip from home- Pedestrian- In vehicle- In airport (AIA). The trials will cover three geographical areas: Athens, AIA and Thessaloniki.

The Greek site implements a “local” platform that integrates basic & existing, site’s service/content:
- Car and pedestrian routing for Athens & Thessaloniki through the PTV server.
- Intermodal public transport (PT) routing through the Greek INTELLECT project. The public transport modes include: domestic flights, railway and maritime transportation.
- Interurban public transport information through the Greek INTELLECT project.
- Public transport timetables (Urban PT, departure from AIA) through Local DB.
- Mapping and geocoding services for the area of Athens & Thessaloniki through the PTV server.
- Point of interest (POI) search through Local DB.
- Athens’ airport activities information through AIA’s server.
- Dynamic flight information arriving/departing from Athens airport also through AIA’s server.

The Greek pilot will use a vehicle provided by HIT. The HIT research vehicle is based on a Lancia Thesis 2.4 20V Emblema. The vehicle is equipped with: (a) an electronic unit (gateway) that gets information (gas, brake pedals position, longitudinal speed/acceleration, yaw rate, steering angle, lights status, wiper status, external temperature) from the vehicle (CAN buses) (b) a frontal ACC radar which provides information about the lead vehicle (distance, relative speed), (c) Small LCD VGA screen installed over the vehicle dashboard to display data to the driver, (d) Lane Departure Warning System and (e) GPS positioning system.

Furthermore, mobile handheld devices, PDA and mobile phones will be used to access the Greek site services: iPAQ h5550, Motorola E1000/A1000.

**Finnish Site**
The Finnish site platform will be operated by Tietotalo Infocenter Ltd. The gateway to Finnish IM@GINE IT system will be the Go Finland portal. The objective of the Finnish site is to implement, validate and evaluate the service and technology developed in IM@GINE IT that enables a consumer via one and single mobile user interface to receive location and routing based information about public transport and tourism services. The Finnish site will utilise for this both the Public Transport Portal of the Ministry of Transport and Communications and the information distribution channel and technology applications that Go Finland Oy (GFO) operates to support the Finnish tourism industry.

The Finnish site implements a platform integrating the following services / content:
- POI search and tourism information using Go Finland and its partners’ data (including for example Finnish Tourist Board).
- Hotel booking.
- Public transport timetable information provided by MTC.
- Public transport routing provided by MTC.
- GIS services (mapping and geocoding and car routing) provided by PTV.

Main target groups are business users and tourist users.

The Finnish site will support access using the following types of end user device:
- Web browser.
- Mobile phone (Nokia 6630 and Nokia 9300).
- PDA (Compaq iPAQ 3970).

For the Finnish pilot tests no in vehicle device will be used.
Italian Site
The Italian Pilot Site covers two types of environments: urban and intercity. The first one will be demonstrated in Turin, while the last one will take place through different Italian cities like Turin, Rome and Verona. There will be different kind of transport modes represented: car (all over Europe), bus (for Turin only), pedestrian (all over Europe), airplane (all over Europe) and touristic. The target user is a tourist, so a multi-language interface will be supported (at least English and Italian).

The main services that the Italian Pilot will demonstrate will be:
- Turin Public Transport Information (timetable, costs, etc.).
- Turin Parking Information.
- Remote route guidance to reach a destination in Turin. Based on user location and mode, the system will provide support to reach the destination. A destination can be parking, bus stop, specific street, POI, etc.
- POI related to car environment condition information (gas stations, etc.).
- Flight information.
- Multi-modal trip (car + PT + pedestrian).

The user is a tourist and can access the platform with a multi-language interface. Using the test site equipment the user has the possibility to:
1. authenticate to service platform;
2. download application;
3. receive navigation information for multimodal trip;
4. receive information about POI;
5. receive Traffic Information;

Pedestrian and car scenarios will be demonstrated. The Italian Pilot distinguishes the equipment of the pedestrian user (mobile devices) from the automotive user’s one. The mobile devices that will be used for the pilots are: (a) PDA/BT + GPRS (eg. Compaq iPAQ 5550 with built-in BT and WiFi interface) will be available from CRF, (b) At least 2 E1000 phones -1 GPRS phone (for the Compaq iPAQ) (b) Possibly 1 additional E1000 or 1 A1000.

The equipment of the Italian car represents a complete and autonomous IMAGINE IT device and it will make the user able to access to all IMAGINE IT services, giving the opportunity to access to personalized, location based services independently from the device used, dependently to the context of use (pedestrian, at home, in car). The central unit of automotive equipment is based on a telematic development platform connected to the needed peripheral devices (GPS, GPRS, BT module). A dedicated display (touch screen) will be integrated in cockpit on which the user can interact with the system. On the telematic platform will be installed the software configuration so to make possible to run agents and NDA as in nomad device. In this way the vehicle telematic platform is completely autonomous.

Hungarian Site
The Hungarian pilot will remain in the service provider state for the whole project serving Hungarian map data, traffic information, location base services, route optimisation, navigation functions in a specified format. User interface and equipment protocol will be established in a different level.
Current elements are:
- GIS engine – developed by Topolisz staff (for map handling, address search, routing, navigation).
- Navigation database – covering the whole Hungary, address information (rural area name, area code, street name, house number), static traffic database (road and street classification, traffic rules) – owned by Topolisz.
- PT database for Budapest – PT stops, lines, time table – owned by Topolisz and updated by BKV (for data license fee).
- POI database – partly owned by Topolisz.

Hungarian pilot aims to give a door to door solution, all information from start to destination. Each end user gets a personalized service for the whole way:
- When to start to reach a given PT line (how long does it take from the start until the PT stop).
- Where to leave the car (P+R parking place).
- Where and when to change (connections in PT possibilities).
- Where can the user find a petrol station, when it is needed.
- Where is the nearest resting place for the driver, during the way.
- What type of services are close to the user – different types of POI.
- Replanning the route if needed (in the case of accident, traffic jam).

For the Hungarian pilot only handheld devices will be used.

Intra-Site
The main goal of IM@GINE IT project is to set the infrastructure, develop, combine and/or enhance travel-related services beyond the boundaries of one country. The ultimate goal is a traveller, who through the IM@GINE IT system will be able to access and utilise mapping, routing, navigation and other related services at the planning phase of an international trip in Europe and during the trip itself. Therefore the intra-site pilot consists the most important pilot of the project, since it aims to demonstrate the IM@GINE IT system’s performance on a European basis and dimension. The users of intra-site pilot will be:
- Tourists
- Businessmen/women
- Social-recreation travelers
- Commuters

Emphasis will be given on tourists and businessmen/women. It can be assumed that a user can use a “business” profile for part of the trip and then switches to “tourist” profile for the remaining part.
For Intra-Site pilot two basic groups of scenarios can be identified:
- Trip by PT. The user chooses to travel by public transport which involves traveling by airplane to the destination country and using the local PT means for his/her transportation to and from the airports. (Also possibility for car rental in Greece).
- Trip by car. The user will travel to the destination country by car. The cars will be the equipped, test cars of the sites.
4. Expected achievements

The technical deliverables of the project are listed below:

- D1.1 Use cases and user/vehicle profile requirements
- D1.2 Services specification
- D1.3 System Architecture
- D2.1.1 IM@GINE IT services prototype
- D2.2 Data Management module
- D3.1 Integrated multi-Agent system
- D4.1 Mobile phone, PDA and mobile PC application
- D4.2 In-car infotainment application
- D5.1.1 Integrated service prototype
- D5.1.2 Integrated service description
- D6.2 Verification pilots results consolidation
- D7.1 Demonstration pilots results consolidation

In more generic words, the following are considered as important outcomes of the project:

a) Multimodal transport information system, including car, ship, airplanes, metro and train, fully interoperable, interfacing existing systems.

b) Universal platform, covering urban, interurban and cross border areas, support seamless provision of info mobility services.

c) Semantic web application. IM@GINE IT will develop a common transport ontology.

d) Dynamic gathering to info mobility services. The users will not need to connect locally.

e) Context awareness, including transport modality (the system knows where the user is and which transport mode he/she is currently using).

f) Agent communication at ontology level. They will be open and interoperable, using FIPA standards.

g) Placement of certain agents in the device, not in the network, thus contributing to a flexible and more secure service.
5. Expected benefits for the Industry

The IMAGINE IT system is an enabling platform for infomobility content synthesis and distribution. It facilitates that content to reach final customers on the move from its origination point. Content is also synthesized in order added value services to be produced. The IM@GINE IT system claims that will bridge the gap between the different, local or mode-specific routing systems, as well as between purely transport and travel/tourism systems, providing thus a complete and borderless solution for the European traveller. IM@GINE IT is based on a "service network" model: different services are linked over a special logic, which is independent of the portal or rather the device.

Within the framework of the service network, IM@GINE IT platform comprises a B2B portal, which collects and synthesizes transport/tourism services & content from various sources (i.e. “content providers & aggregators”) and may make the integrated final service available through different portals to end users. The project provides the software solutions in order to facilitate end-to-end service delivery. However, the main objective of this B2B portal is a) to promote infomobility products to the international market and b) to add value in existing content. As services to end users become more complex and offer more diversity, we are experiencing the concept that ‘content is king’, becoming a reality. The shift in value in the industry is moving towards applications and services to end users. However, most of the infomobility content industry’s stakeholders lack the necessary resources or investment to address directly the B2C market. Moreover, they lack control over the Data Transportation infrastructure (i.e. wireless networks). On the contrary big portals or most importantly Mobile Network Operators for the mobile data market, have established B2C markets, follow multi-national deployment strategies and most importantly hold the wireless networks and user location information.

In this context, the platform will be a future e-marketplace for infomobility content products in which the various content providers and B2C players, such as mobile network operators, can interact.

The consortium has developed an abstract value chain, shown in next figure. The abstract value chain is divided into two layers, namely the “service chain” and the “system development chain”.
Figure 4: IMAGINE IT abstract value chain.

**Content provider:** Offers any type of basic content required by the system operation: traffic, public transport timetables, tourist information, map data. It publishes those to a series of service providers through existing commercial agreements.

**Service provider:** Aggregates and offers most types of content required by the system operation. It surely provides GIS related, geo-referenced services. It publishes those to the Service Integrator in a “standardised” interface.

**Service integrator:** Integrates the content and services provided by the various service providers within a multi-agent based system (MAS). It provides the agent protocols to the content aggregators and through the B2C agents to the device. It is responsible for offering the specified IMAGINE IT Service.

**B2C agent:** Provides the “last mile” link to the end users. It is responsible for the IMAGINE IT service delivery through interface with the service integrator. The B2C agent should integrate IMAGINE IT applications and interfaces with existing resources.

**Device facilitators:** The consumer interface enabled by the IMAGINE IT nomad device application. It refers both to handheld devices as well as in-vehicle devices or an interactive combination of both. It could be a stand-alone, independent entity or provided through the B2C agent.
**Software developer:** Develops a part of the IMAGINE IT software suite and thus is an owner of a specific IMAGINE IT exploitable product.

**System integrator:** A software developer that has the resources and case in order to deploy the IMAGINE IT system on behalf of a business customer.

**Application Hosting:** A technological provider that has the resources and case in order to host the IMAGINE-IT system on behalf of a business customer, regardless of whether it has developed the system or not.

**Device producer:** Manufactures and/or integrates devices, either nomad handheld or in-vehicle devices.

The two major beneficiaries in the value chain are those of the Service Provider & the B2C Agent. The following table shows what are the existing products envisaged to be enhanced by IMAGINE IT, what are the IM@GINE IT products that will become enabling tools for the enhancement and the beneficiaries.

<table>
<thead>
<tr>
<th>Beneficiaries</th>
<th>Existing products/value</th>
<th>Intermediate step</th>
<th>IM@GINE IT added value</th>
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<td>Service providers</td>
<td>Infomobility content</td>
<td>Web services</td>
<td>Provider agents Ontology definition MAS</td>
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<td>Existing networks and B2C clientele</td>
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<td>B2C server Device application PAA IM@GINE IT end user services</td>
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</table>

**Table 3:** IM@GINE IT products, existing products and beneficiaries.

The service providers offer content to the system by using enabling tools such as provider agents and through a common ontology. This way the system becomes easily expandable to include more service providers in the future depending on commercial agreements.

The B2C agents need a license of the B2C server, and as many licenses of the PAA & device (downloadable) applications as the number of final customers. Through commercial agreements with the entity operating the MAS they get access to value added services produced by the system.
5. Expected impacts

As major expected impacts, the following can be highlighted:

- A service platform like IM@GINE IT will promote and speed up the European integration process. Seamless access to internationally distributed data and service sources with the free choice of the output device, the flexible combination of services and the ability to directly pay for the chosen service, clearly shows the chance that stands behind IM@GINE IT.

- The optimisation of HMI’s for all devices/vehicles by providing services with adaptable HMI helps to result in a stronger market. Especially security related functions, like switching the service in addiction to the vehicle speed are also related to traffic safety.

- IM@GINE IT will enable the development of a European wide business-net, offering viable value proposition to all participants directly or indirectly involved in it (content providers, service providers, transport service operators, vehicle manufacturers, mobile device manufacturers, in-vehicle equipment manufacturers, network providers and the European citizen). The model adopted facilitates the collaboration between different platforms and systems, through interoperable solutions concerning the data, service and UI points, thus leading to the clustering and strengthening of a currently rather segmented European ITS and info-mobility market.

- Seamless travel and tourism information coverage across Europe will be promoted based upon advanced, reliable and high quality dynamic services; thus creating new financial and recreational opportunities.

- DG INFSO policy actions support, by providing pilot results and the in-vehicle device and intelligent user interface, and relevant recommendations for optimal in-vehicle provision of info mobility services will be proposed.
Annex A: Coordinator contact details

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Annex B: IM@GINE-IT Consortium

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<th>Participant short name</th>
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Table 4: Participants list.
Annex C: Short project description (3 pages)

1. Project data

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<td>Coordinator details</td>
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<tr>
<td>Name</td>
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Table 1: Summary of project data.

2. Project main goals

The main objective of IM@GINE IT is to provide one and single access point through which the end user can obtain location based, intermodal transport information (dynamic and static), mapping & routing, navigation and other related services everywhere in Europe, anytime, taking into account personal preferences. Thus, the key phrase behind IM@GINE IT is: *facilitation of seamless and personalised travel in Europe*. More specifically, IM@GINE IT aims to:

- Cater for intermodality & seamlessness of travel by synthesising information of all modes.
- Bridge the gap between in-vehicle and off-board information and navigation systems.
- Bridge the gap between vehicle-pedestrian navigation method (seamless, intermodal).
- Be capable of collecting and managing data from different sources.
- Cater for interchangeability & seamlessness of communication technologies (access everywhere).
- Be able to “roam” between different media providers.
- Be capable of acknowledging the location of the end user, thus switch between different positioning methods depending on the special requirements of the user place or mode.
- Be capable of navigating the end user at all levels (e.g. micro within an airport, middle within a city or area, and macro during intercity travel), and for the whole intermodal travel.
- Provide other related location based or travel oriented services, s.a. booking/ticketing.
- Perform complex tasks and according to user’s preferences (e.g. automatic selection of best travel plan, intelligent filtering & synthesis of information & services, booking/ticketing).
- Provide an external data editor, which allows to an external content provider to update and enhance a central IM@GINE IT database.
• Allow the driver to focus to the primary task of driving (safety) by adapting IM@GINE IT personalised services to the warnings, info and automate procedures from the vehicle.

3. Technical approach
IM@GINE IT will cater for the following personal needs: Being, Knowing, Wanting, Acquiring, Enjoying. This will be achieved by providing information (‘knowing’) that allows a choice of services according to user preferences (‘wanting’), arranging for the remote booking of those services (‘acquiring’), facilitating trip planning according to user preferences (‘wanting’) through the provision of mobility information (‘knowing’), on-line booking and ticketing (‘acquiring’), in a way that ensures maximum comfort (‘enjoying’) and is customised to the consumer’s profile (‘being’). The objective of the system is thereafter to support the user in satisfying his/her basic needs for journey planning and trip support. The user basic needs are:
• The user does not always know what and where the destination is (geographically).
• The user does not know the route & timetables to the destination.
• The user needs to make reservations.
• The user does not know the current transport status and situation.

The following scenarios of use are therefore identified:
• Plan a new journey from origin, i.e. home (pre-trip).
• Plan a new journey while on trip.
• Plan a deviation to an existing trip.
• Bookmark or activate a planned journey.
• Ask for supporting services to trip execution (e.g. navigation according to planned route).
• See details of a bookmarked or active journey.
• Push events that may change the details of the active journey.

The overall architecture of IM@GINE IT is composed of the following main actors:
• the user;
• the service structure and the modality to access;
• the server side telematic platform, which manages content, services and user profiles;
• the device side application which hosts temporary users’ preferences, interaction with other applications and user interface;
• the infrastructure on the field.

The IM@GINE IT system will constitute a platform comprised of Data management, Web services, Intelligent Agents and Communication gateways. The platform should interface with Content providers, Service providers, GIS systems, Ticketing systems, Added value systems and Media providers. The platform will be able to:
• Obtain data from different sources.
• Provide a data editor to allow the input of data from external partner.
• Perform data synthesis for specific requirements of transport modes and environments.
• Obtain external services.
• Perform service synthesis according to personal profile and user position.
• Geo-reference all data and services.
• Perform route referencing and logical localisation.

Four different local applications will be developed depending on the device’s type (mobile phone, PDA, in-vehicle, mobile PC; various sizes, communication means, computing resources’ capabilities, etc.).
The development of an intelligent system is based on agent technology that will integrate the existing information and services, adjust it to the personal preferences, providing thus seamless services according to the user needs. An original combination of four agent types will be designed and developed, each dedicated to a specific task: the provider agents, the transport mode agents, the personal assistant agent (PAA) and the middle agent.

4. Expected achievements
The following are considered as important outcomes of the project:
1. Multimodal transport information system including car, ship, airplanes, metro and train, fully interoperable, interfacing existing systems.
2. Universal platform, covering urban, interurban and cross border areas, supporting seamless provision of info mobility services.
3. Semantic web application. IM@GINE IT will develop a common transport ontology, producing a de facto standard that will provide tourism and transport information altogether.
4. Dynamic gathering to info mobility services. The users will not need to connect locally.
5. Virtual service/contact points, as consequence of using semantic server.
6. Context awareness, including transport modality (the system knows where the user is and which transport mode he/she is currently using).
7. Agent communication at ontology level, open and interoperable, using FIPA standards.
8. Placement of some agents in the device, contributing to a flexible & more secure service.
9. Interfaces following common design guidelines allowing on-board and off-board applications, through the same UI and mobility device.

5. Expected impacts
As major expected impacts, the following can be highlighted:
1. Promotion and speed up of the European integration process. Seamless access to internationally distributed data and service sources with the free choice of the output device, the flexible combination of services and the ability to directly pay.
2. The optimisation of HMI’s for all devices/vehicles by providing services with adaptable HMI leads to a stronger market. Especially security functions are related to traffic safety.
3. Development of a European wide business-net, offering viable value proposition to all participants involved in it (content providers, service providers, transport service operators, vehicle manufacturers, mobile device manufacturers, in-vehicle equipment manufacturers, network providers and the European citizen). The model adopted leads to the clustering and strengthening of a currently rather segmented European ITS and info-mobility market.
4. Promotion of seamless travel and tourism information coverage across Europe based upon advanced, reliable and high quality dynamic services; creating new financial and recreational opportunities.
5. DG INFSO policy actions support, by providing pilot results and the in-vehicle device and intelligent UI, and proposal of relevant recommendations for optimal in-vehicle provision of info mobility services.