FUTURE INTERNET PPP

Instant Mobility

Multimodality for people and goods in urban areas

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WP7 – D7.7
Exploitation plan - final version

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D7.7 Exploitation plan - final version

WP7.4	**D7.4 Exploitation plan - interim version**
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Deliverable abstract

Dissemination is intrinsically linked to exploitation since effective publicity is necessary for exploitation of these results during and beyond the project lifetime. Moreover dissemination allows to measure acceptance of the proposed concepts.

While the Dissemination Plan defines the strategy and planned activities, the Plan for Using and Disseminating the Knowledge (or Exploitation Plan), presents in detail the actual dissemination activities[1] throughout the project duration and how they support exploitation of the project's results. The present document is the thirdd and final version of the Instant Mobility exploitation plan; a preliminary version was delivered in October 2011 and an interim version in May 2012.

This deliverable describes (1) the activities undertaken within the project scope that have a strong influence on exploitation possibilities; (2) the main exploitable outcome of the project and (3) consortium partners' individual intentions towards exploiting the project results to support their own business and activities. It also presents an overview of all dissemination activities implemented during the course of the project to raise awareness, understanding and support of the project results in order to support their exploitation after project end.

[1] As well as an update of the strategy and planned activities with every new version since no multiple versions of the Dissemination plan are foreseen in the Description of Work.

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Terms and abbreviations

Abbreviation	Definition
3GPP	3rd Generation Partnership Project
4G	Fourth generation of mobile communications standards
AaaS	Algorithm as a Service
AD	Application description
API	Application Programming Interface
ATAC	Azienda per la Mobilità del Comune di Roma SpA'
B2B	Business to business
CaON	Converged and Optical Networks
CDI	Connected Devices Interfaces
CDN	Content Distribution Networks
CEA	Commissariat à l'Energie Atomique et aux Energies Alternatives
CEN	European Committee for Standardisation
CO_2	Carbon diaxide
COST	European Cooperation in Science and Technology funding instrument
CVIS	"Cooperative Vehicle Infrastructure System" EC project
D	Deliverable
DATEX	DATa Exchange standard
DBMS	DataBase Management System
DDS	Data Distribution Service
EC	European Commission
ELSA	European Large Scale Actions
EPCGlobal	Electronic Product Code standard
ERTICO	European Road Transport Telematics Implementation Coordination Organisation S.c.r.l.
ESB	Enterprise Service Bus
ETSI	European Telecommunications Standards Institute
EU	European Union
EUCAR	European Council for Automotive R&D
EWSP	Europe Wide Service Platform
FI	Future Internet
FP7	EU's Seventh framework programme for research and technological development
FT	France Telecom SA
GDF	Geographic data file
GE	Generic Enabler (from FI-WARE)
GENIVI	Non-profit industry alliance committed to driving the broad adoption of an In-Vehicle Infotainment (IVI) open-source development platform (GEN is a concatenation of Geneva, the international city of peace)
GHz	Gigahertz
GMLC	Gateway Mobile Location Centre
GPS	Global positioning system
GSMA	GSM Association
HMI	Human-machine interface
HOV	High-occupancy vehicle
I2ND	Internet of Networks and Devices (GE of FI-WARE project)
IaaS	Infrastructure as a Service
ICT	Information and Communication Technologies
I+D	Investigación y Desarrollo
IETF	Internet Engineering Task Force
IFSTTAR	French institute of science and technology for transport, development and networks
IM	Instant Mobility
iOS	iPhone Operating System
IoT	Internet of Things
IP	Internet Protocol

IPv6	Internet Protocol version 6
IRU	International Road Transport Union
ISBAK	Istanbul Transportation Telecommunication and Security Technologies Industry and Trade INC.
ISO	International Organisation for Standardisation
ITS	Intelligent transport systems
KPI	Key indicator performance
LTE	Long Term Evolution (mobile communication standard)
M	Month
MLP	Mobile Location Protocol
MS	Milestone
MS1	Initial requirements
MS2	Scenarios
MS3	Societal Issues
NFC	Near field communication standard
NoE	Network of Excellence
NoSQL	Not only SQL
NTIC	New information and communication technologies
OBU	Onboard Unit
OMA	Open Mobile Alliance
OMG	Object Management Group
PaaS	Platform as a Service
PCM	Project Management Committee
PPP	Public Private Partnership
PU	Public
PUFD	Plan for the Use and Dissemination of the Foreground
RAS	Radio Access and Spectrum
REST	Representational State Transfer (Web service design model)
RTD	Research and Technological Development
SaaS	Software as a Service
SAFESPOT	“Cooperative vehicles and road infrastructure for road safety” EC project
SAML	Security Assertion Markup Language
SIRI	Service Interface for Real Time Information standard
SOA	Service-oriented architecture
SOAP	Simple Object Access Protocol
SQL	Structured Query Language
SW	Software
TBC	To be confirmed
TC	Technical Committee
TCP	Transmission Control Protocol
TISA	Traveller Information Services Association
TNO	Netherlands Organisation for Applied Scientific Research
TPEG	Transport Protocol Experts Group
TRANSMODEL	Reference Data Model For Public Transport standard
TV	Television
UA	Usage Area
UMTS	Universal Mobile Telecommunications System
USDL	Unified Service Description Language
VM	Virtual machine
V-RSU	Virtual roadside unit
VTT	Teknologian Tutkimuskeskus (Technical Research Centre of Finland)
V2V	Vehicle to vehicle
V2I	Vehicle to infrastructure
W3C	World Wide Web Consortium
WG	Working group
WP	Work package
WP2	Program collaboration
WP3	Use Case Scenarios Work package

WP4	Future Internet Enablers Work package
WP5	Realisation and prototyping Work package
WP6	Societal Issues Work package
XaaS	As A Service
XML	EXtensible Markup Language

1. Introduction

1.1 Purpose of the document

Article II.4.2.b of EC standard Grant Agreement for FP7 projects stipulates the "Plan for the Use and Dissemination of the Foreground (PUDF)" as part of the contractual reports to be delivered by project end (where "Foreground" means the results, including information, materials and knowledge, generated in the project), as a means for the Commission to assess the success of a project.

Partners are expected to report with enough details on the actual and expected "use" to be made of the foreground, i.e. on their strategy and concrete activities to disseminate and exploit the project results (Article II.29[2]).

A preliminary PUDF was already included in the project Description of Work itself. During the implementation of the project, the partners have to report periodically to the Commission on any activity carried out in relation to the PUDF. A final version is then submitted at the end of the project and describes detailed plans for the management of foreground.[3]

1.2 Scope of the document

The PUDF is divided into two sections[4]:

1. A public one related to results that will be disseminated and the corresponding dissemination activities (specifying the target audience and the applied communication strategy, and presented in a verifiable way to ensure that the EC can keep track of them);
2. A confidential one describing exploitable results and related planned activities. This section should include:
   - a verifiable list of all intellectual property rights that have been applied for or registered (e.g. a European patent has been applied for);
   - a list of all the results that may have commercial or industrial applications (e.g. software, inventions, prototypes, compiled information and data, etc.)
   - an outline of the owner of each particular element of foreground, whether it is a single participant or several of them (in a situation of joint ownership).
   - an explanation of how the foreground has been or is going to be used, in either further research or commercial exploitation activities, including elements such as the following:
     - purpose, main features and benefits of each technology or product, derived from the research results: innovative aspects in comparison Intended audience
     - with technologies and products already available, needs for further R&D activity and implied risks, collaboration needs for exploitation (technology transfer activities);

[2] FP7 Grant Agreement - Annex II – General Conditions Version 6, 24/1/2011
[3] "Strategic Guide to Successful Use & Dissemination of the Results of Research & Development Projects", published by the FP7 USEandDIFFUSE project (2009), page 67.
[4] Guidance Notes on Project Reporting, FP7 Collaborative Projects, Networks of Excellence, Coordination and Support Actions, Research for the benefit of Specific Groups (in particular SMEs), Version June 2010, page 24.

- customer detection: identification of the potential customers and the factors that affect their purchasing decisions;
- features of the target market: size, growth rate, share that the technology/product could reach, driving factors likely to change the market, legal, technical and commercial barriers, other technologies likely to emerge in the near future;
- how the participant (or other entity) entitled to the technology exploitation is positioned (or should be positioned) in the market, competing businesses/applications/technologies.

The plan should also describe:

- the socio-economic impact of the results
- any contributions to standards or policy developments

1.3 Intended audience of this document

The Exploitation Plan is aimed at the following audiences and respectively at the fulfilment of the following objectives:

- European Commission: to communicate the consortium's strategy and report on dissemination activities;
- Consortium partners: to inform about participants' rights and obligations, as well as notify other participants about partners' intentions in order to enable them to exercise their right to object in case their legitimate interest could be impaired.

2. Related regulations

2.1 Contractual requirements

Ownership, use, dissemination and access rights are stipulated in the "Part C INTELLECTUAL PROPERTY RIGHTS, USE AND DISSEMINATION" of Annex II - General Conditions to the FP7 Model Grant Agreement:

- The beneficiaries shall report on the expected use to be made of foreground in the plan for the use and dissemination of foreground. The information must be sufficiently detailed to permit the Commission to carry out any related audit.
- Any dissemination activity shall be reported in the plan for the use and dissemination of foreground, including sufficient details/references to enable the Commission to trace the activity. With regards to scientific publications relating to foreground published before or after the final report, such details/references and an abstract of the publication must be provided to the Commission along with an electronic copy of the published version or the final manuscript accepted for publication.
- Any dissemination action concerning foreground must include a statement acknowledging the financial support of the European Community, as well as a disclaimer specifying that it reflects only the author's view, exempting the Community from any liability. Any publicity concerning the project must also display the EU emblem.

2.2 Definitions[5]

"Use" is defined as the direct or indirect utilisation of foreground in further research activities other than those covered by the project, or for developing, creating and marketing a product or process, or for creating and providing a service.

"Direct use" implies that partners utilise the results themselves for commercial applications (e.g. by producing and/or commercialising a new product or by integrating a new process into their manufacturing plant) and/or for further research ("further" with respect to the scope of the project in which the foreground is generated).

"Indirect use" implies that partners may allow third parties to exploit the research results through a specific agreement.

2.3 Intellectual property management

The Consortium Agreement is a very important document when it comes to ownership and sharing of Knowledge or project results, as it sets out or further defines how the consortium agrees on the use and dissemination of the project results.

The background[6] that is brought into the project will always remain the property of the partner involved. Those partners making available pre-existing know-how during the course of the project will specify any conditions for access thereto in the Consortium Agreement.

The Consortium agreement will dedicate one section or one appendix to define which access rights may be granted to any background. Also background to be excluded from access rights in

[5] Source: http://www.ipr-helpdesk.org/documents/ES_UseForegroundFP7_0000006654_00.xml.html

6 "Background" is project-related information and IP rights held by participants prior to the signature of the Grant Agreement.

any event will be specified in another dedicated section or appendix. All other background will be considered as unnecessary and excluded from the access rights.

In the case of the foreground, i.e. the project results and any IPR that can be attached to them, typically it is owned by the participant that carried out the work from which it resulted. Nevertheless, the intention of the Instant Mobility consortium is to strive for a maximum of openness in the design and operation of the Transport and Mobility Internet. This platform will facilitate the pooling of data and services and could thus lead to maximum growth of the eventual market. Also, any genuine service or information provider should be freely able to join the network and add to the choices on offer to customers.

Partners working in the same WP have Access Rights to all foreground and background needed for the execution of the WP, from all WP Partners. Participants from other WPs enjoy the same access to foreground and background, if these form part of a deliverable or are necessary for the execution of the sub-project.

Bilateral agreement between the Contractors participating in the same WP or in other WPs may be set if Contractors believe that foreground or background forms part of a deliverable of the other WPs or is necessary to carry out activities in the other WPs. These access rights can be extended to affiliates that are participating to the project, but these rights will expire at the end of the project

2.4 Patents & protection

Publication and dissemination of foreground are granted with the approval of the Consortium, making sure that the period of confidentiality needed for a successful patent application is respected.

Any patent applications relating to foreground filed shall be reported in the plan for the use and dissemination of foreground, including sufficient details/references to enable the Commission to trace the patent (application). Any such filing arising after the final report must be notified to the Commission including the same details/references.

Contractors have to inform the Consortium and the Commission of its intention to publish on its foreground. Publication can be impeded if another contractor can show that the secrecy of the foreground is not guaranteed.

Where the foreground is capable of industrial or commercial application and its owner does not protect it, the Union may, with the consent of the beneficiary concerned, assume ownership of that foreground and adopt measures for its adequate and effective protection.

3. Section I – Disseminating the foreground

3.1 Scope of the project

The physical world of urban transport and mobility is a world where virtually every person is both a traveller and a user of goods transport and where there are many different ways to travel or deliver goods. What is remarkable today is how few of these travellers, vehicles and transport infrastructures are connected with each other.

Global and local optimisation of urban mobility could be achieved if the total information for current and future transport and mobility in a given area were available in real time

In the Instant Mobility vision, every journey and every transport movement is part of a fully connected and self-optimising ecosystem in which travellers, goods and collective transportation can benefit from personalised and real-time information. On the basis of each traveller's declared destination, this journey characterisation is extrapolated to a forecast for the near future evolution.

The Instant Mobility consortium believes that Future Internet capabilities in technical domains such as localisation, continuous connectivity, Internet of Things, cloud computing, smart mobile internet platforms and a host of personalised online mobility services, will within a few years significantly modify urban transportation and open new business models for relevant stakeholders:

- a "Mobility App-Store" of innovative applications and services will be online for consumers and operators, while opening new business models for data and service providers;
- city traffic managers will adapt and control their signal network knowing all vehicles' location, movements and intended destination via the Internet cloud;
- public transport and taxi operators will match fleet vehicles, routes and timetables with actual demand, captured through wireless sensors and passengers' online itineraries; ticketing and payment will be integrated and online from the user's mobile handset.

3.1.1 Benefits

The increased connectivity allowed by Future Internet technologies will bring more information, fresher and personalised information, and thus **greater intelligence** for planning journeys and for being aware of service changes and disruptions as they happen.

The Instant Mobility platform will be the central meeting point for a vast quantity of transport-related data coming from vehicles, travellers, goods and infrastructure. The **real time** data collected from these will be transformed into consolidated information to assist individual travellers, and to feed innovative services using this information.

Thanks to Future Internet technologies, information will be "mashed-up" with services, improving both location-linked information and navigation maps update, for individuals, and a comprehensive overview, for traffic managers.

In addition to the direct time and cost savings for travel and transport operations, the Transport and Mobility Internet as B2B platform will vastly increase access to potential business partners, leading to **increased business efficiency**, while opening new markets in, e.g. security and information.

The main goal of Instant Mobility services is to improve the **mobility** of transport but also its **environmental sustainability**. Indeed, several use case scenarios, including the vehicle sharing

scenario that aims at increasing vehicle occupancy, target the reduction of the number of vehicle movements and therefore of fuel consumption and CO_2 emissions.

The aim to **improve performance** through application of Future Internet technologies applies mostly to operational systems, such as for traffic or fleet management, but can also apply to individual means of transport. The innovative services such as online car- and ride-sharing will gain in performance when the Internet platform brings many more potential suppliers and passengers into play.

The extra intelligence described above when applied to journey planning and assistance, for example, will **reduce journey time** uncertainty and **increase reliability** – giving generally faster, shorter and **more comfort**able travel. It will certainly mean that bus, tram and taxi services will be speedier, with less delays, thanks to demand-supply matching and thus better vehicle planning, and crew scheduling.

3.1.2 Innovations beyond state-of-the-art

Future Internet is an ambiguous term meaning either the benefits and/or the new services one might expect from technological advances or the technological advances themselves.

Probably the most significant innovation will be the realisation of a **Future Internet-enabled ecosystem** where each traveller, vehicle, traffic system component, goods consignment and service centre will have an IP address, and will produce, exchange and use information, which will be applied in a wide range of mobility services enhancing comfort, convenience, reliability, sustainability, efficiency and safety of travel for all.

In relation with the *multi-modal journey optimisation* for travellers, the advances cover the set of functions necessary to collect, process and provide in near **real-time** all the information related to each elementary mode of transport and each traveller participating in the multi-modal journey system. The specified target system will provide algorithms for optimising allocation of transport means, using innovative **integration** of multiple information sources into one single user-friendly platform and an **open format** for data processing, storage and exchange (there is an increasing approach in sharing transportation data through open API). Moreover the project will also integrate a **single** multimodal **ticketing and billing system** from multiple (and even competing) operators for inter-modal travellers' convenience. Instant Mobility will demonstrate the feasibility of such system optimising urban multi-modal travel in real-time.

The project will define an **interchange language** for any public transport operator to publish its information in an **interoperable** way, as this is a key enabler to develop new services based on public data provided by several service providers. Instant Mobility will provide a capacity for travellers to request multi-modal solutions **independently of** dedicated **operators** and to get **automatic** periodic **update** of their itinerary planning without having to proactively solicit the system.

Instant Mobility scalable **architecture** is an innovation in itself, allowing to integrate an important number of real time-monitored multimodal itineraries and forecast near future situation evolution.

Additionally, Instant Mobility will reverse the traditional approach in the automotive domain to provide Internet-based services to drivers through infotelematics onboard units, and rather "let the vehicles go into the Internet": i.e. information owned by the vehicle about e.g. the vehicle itself and the external environment (acquired from onboard sensors or calculated through data fusion mechanisms) can be sent to the cloud via standard **Vehicle-to-Nomadic interaction** and enable the development of new automotive-oriented mobility services.

The Instant Mobility **information sharing** approach is innovative in that it uses people and vehicles as sensors, but also because it includes new components to assume **privacy** and anonymous mechanisms.

Regarding **on-the-spot vehicle sharing** (capability to use its available seat during the part of travel where it is unused) in multi-modal journeys, Instant Mobility will enable:

- Negotiation functions between travellers and drivers allowing the acceptation of offers based on social networking and cross-rating of participant;
- Payment functions allowing proportional automatic contribution to the journey cost;
- Professional functions for taxi and fleet cars to optimise their operations.

Instant Mobility will allow realtime planning and coordination for small and mid-sized delivery trucks in cities. Mobile technologies will propose bi-directional information flows and customers and suppliers will be able to update parcel profiles and characteristics in a homogeneous way for **last-mile parcel tracking and delivery planning optimisation**. This coupled with eco-driving coaching for professional drivers will minimise the traffic and CO_2 loads in city centres.

Moreover the project will use Future Internet cloud computing capabilities to reduce the cost of buying additional dedicated traffic management platforms and rather perform **traffic control** operations **in the cloud**, integrating all the data coming from the different monitoring technologies so as to calculate and provide real time information and strategies in secure virtual traffic signal controllers and virtual traffic centre.

Finally, in the same way as projects like CVIS or SAFESPOT have created the ground for implementation of a huge number of cooperative mobility applications based on the communication network using IPv6 (on 5.9 GHz ITS channel plus UMTS/LTE), Instant Mobility can become the “fire” to accelerate the deployment process of Future Internet.

3.2 Target groups

The goal of “dissemination” is to promote and raise awareness about the project achievements, and communicate its benefits to the wide stakeholder community, including the developers, providers and users of the services, but also the content providers, the various operators involved and the policy makers, who all have an influence on the future deployment of these solutions.

Instant Mobility partners include main European **industrial players** and **service providers** from the **transport** and **ICT** sectors, who will accelerate the creation, management and deployment of new products, services and business models for transport and mobility based on future Internet technologies, in the following categories:

- Multimodal journey optimisation
- Vehicle sharing
- Public transport
- Goods transport
- Traffic management
- Mobile payment

Moreover the project results will be of great interest not only to transport professionals but also to local, national and European **authorities** (special attention will be given to **cities**, given the

project focus on urban transport and mobility). These are the people who should bring these new technologies into their planning for investment leading to Europe-wide deployment.

The results will – if properly presented and disseminated – also be of great interest for potential **end users**, but perhaps it is **industry and business users** who will be the most keen to learn of these results, as Future Internet will bring opportunities for a breakthrough in the **transport and mobility services sector** similar to the explosion of applications ("apps") already occurring in the smartphone and mobile internet service markets.

The following table defines the potential actors of the different Instant Mobility applications:

Name		Definition
Traveller		A person with a current geo-location, a geographical destination and preferences. Travellers include public transport users, motorists, private car driver (going to some personal destination) or any passenger
Driver		A person driving a individual means of transportation, able to interact with the others actors in the various scenarios
	Private car Driver	A person owning and driving a private car
	Professional Driver	Lorry drivers, delivery van drivers, public transport drivers, taxi driver, etc
Passenger		A person using one or several means of transport to travel from one point to another, but doesn't drive a car during his trip
Consignee		The person to whom a shipment is to be delivered
Consignor		The person who delivers a shipment to consignee
Service provider		Provides, manages and updates the running service, on the server side (e.g. booking services provider, trip planner, ridesharing provider); includes service integrator
Telecommunication network operator		Provides fixed backbone access to Internet and mobile internet connection; also provides additional extra services e.g. billing, mobile payment, location services
Financial services provider		Provides services such as mobile payment clearing, pay-by-use mobility services, etc.
Device and system provider		Manufacturers devices (e.g. Apple, Nokia) or provides software
Data provider		Provides traffic data, map contents, location based contents etc; includes map provider and content provider
Mobility information broker		Collect and publish the information coming from all kind of producers, anonymise and transform it so as to make it available under various contractual condition to existing or potential new business services
(collective) Transport operators		Operates public transport, air transport, ferry, trains including bus companies, airlines and rental bicycle operators
Terminal operators		Operates transport hubs, e.g. airports, ports
Parking manager		Manages a car park
Fleet manager		Manages vehicles fleet for logistics company or transport

	operator, aspects of drivers and vehicles not covered by the transport planner
Logistics transport planner	Plans the transport resources and itineraries of goods, and assigns the transport bookings to the appropriate transport resources.
Transport Booker	Books a transport with the transport operator, sometimes but not always the same person as the consignor
Traffic operator	Manages road traffic and infrastructure, e.g. traffic lights; including urban road operator and motorway operator
Vehicle OEM	Integrates on-board unit in the car; provides vehicle data and features for in-car usage of the application; it can be a car maker or a first-level supplier
Public Authorities	Makes transport planning, strategies and policy including transport planner
Emergency operator	Human entity or organisation that uses the facilities of the system to manage some of the activities carried out by the Emergency Services in response to incidents, including management of vehicles belonging to the Emergency Services, plus the provision and receipt of information about the incidents
Freight operator	Human entity or organisation that uses the facilities of the system to manage the transportation of freight (can also fulfil the role of fleet operator)
Highway operator	Manages highways infrastructure (stop area, bridge, tunnel, toll); responsible for maintaining the roads and managing the traffic on it
Insurance company	Private company insuring vehicle damages that may wish to offer to fleet owners or private drivers new fares policies based on cooperative systems

The dissemination process aims to spread information among all potentially concerned stakeholders and to all levels of policy-makers, as well as to **certification and standardisation bodies**, **engineering organisations** and **universities** (regarding specification of competencies and agenda for future research).

This approach will be eased by the presence of **research and academic organisations** and other stakeholders' representatives in the Instant Mobility consortium (ERTICO, IRU, EUCAR and the Humanist NoE) and associated partners (see chapter 3.2.1).

ERTICO will make use of its Partner Sector Platforms, where leading actors in specific communities already come together around intelligent transport systems (e.g. Public Authority Platform; Mobile Network Operator Sector; Vehicle Manufacturer Platform; Research Establishment Platform).

Moreover ERTICO is coordinator of the iMobility Forum, formerly known as the eSafety Forum, which was set up by the European Commission as a multi-sector stakeholder platform for dissemination of newest developments in ITS for safety and mobility. The Forum also includes a number of Working Groups where concerned actors collaborate to define consensus in technical areas needed to facilitate ITS deployment.

Furthermore, ERTICO coordinates the Network of National ITS associations, thus offering an outlet to thousands of ITS-related organisations via the 26 Network members, shown in the figure below.

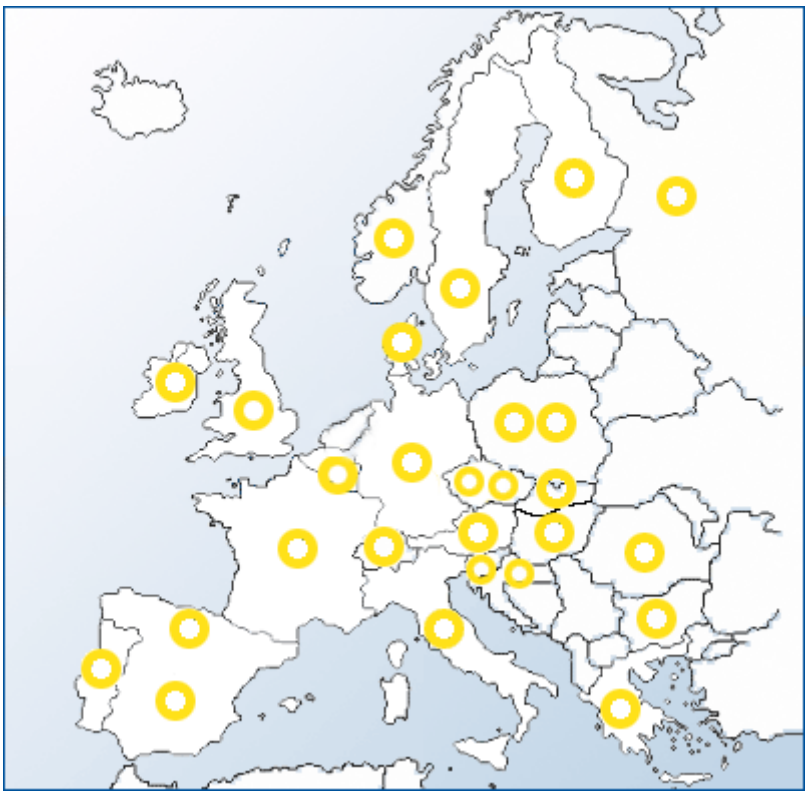


Figure 1: Map of the 26 members of the Network of ITS Associations

Networks of which VTT is a member that will be addressed include:

- European Research Area (ERA-NET)
- NTF (Nordic Transport Research Forum)
- Transport Research Knowledge Centre
- EIT ICT Labs (European Institute of Technology)
- EARPA (European Automotive Research Partners Association)
- FERSI (Forum of European Road Research Institutes)
- ECTRI (European Conference of Transport Research Institutes)
- eSafety Forum (WG Implementation Roadmaps, WG RTD)

The consortium members intend to reuse, valorise or integrate results from previous **related projects**[7] which they have been or are still involved in either as coordinator or partner. For example, TNO is a central partner in almost all the "smart mobility" programs in the Netherlands, which is a top sector of the Dutch Innovation Policy. Reciprocally they will also use those projects as channels for disseminating Instant Mobility results: for example, IFSTTAR is involved several NEARCTIS (Network of Excellence for Advanced Road Cooperative traffic management in the Information Society) and European COST action ARTS (Towards Autonomic Road Transport Support Systems), which considers applications and assumptions that are close to Instant Mobility ones. COST (European Cooperation in Science and Technology) is one of the longest-running

[7] A non-exhaustive list of these main projects from which Instant Mobility can reuse parts from scenario definitions to user experiences on various traffic services, is included in annex of this deliverable. The consortium members have been or are involved in most of these projects either as coordinators or partners.

European instruments supporting cooperation among scientists and researchers across Europe. IFSTTAR also manages a national Academy/industry Forum about new technologies and transportation[8] in which they plan to give presentations about the project.

In addition, Instant Mobility will actively contribute to FI-PPP programme activities to ensure that all synergies with other FI projects are exploited (see chapter4.1.2).

3.2.1 Associated Partners

Instant Mobility associated partners comprise a number of well-known and prestigious organisations, either public or private which have expressed a strong willingness to contribute or benefit from Instant Mobility results and future outcomes.

Their contribution will be complementary to the project partners' work and will cover all aspects of the project phases.

- **Cities, local and regional authorities**

  Cities and local authorities are the most important partners of the Instant Mobility project as they represent end citizens and other users' needs.

  The City of Toledo (Spain) is a strong associated partner willing to evaluate and experiment new mobility solutions to solve Toledo mobility strong issues in an innovative and citizen oriented manner.

  The Conseil Général des Yvelines (France) is supporting the Instant Mobility project and envision to experiment Instant Mobility multi-modality solutions when available.

  Istanbul Metropolitan Municipality (Turkey) is associated to ISBAK and will experiment some of the outcomes of the project within the Istanbul city context.

- **Industry**

  Continental AG as a leading car equipment maker will contribute to the prototyping of mobility services from the car drivers' viewpoint, thus providing an alternative implementation to the project one.

  Integrasys is assisting us in providing mobility solution in Spain and with the city of Toledo.

- **User associations**

  The following user associations fully support the Instant Mobility project and are committed to participate to our open workshop to comment and enhance the scenarios and use cases driving the project:

  - EUCAR, the European Council for Automotive R&D
  - TISA, the Traveller Information Services Association
  - IRU, the International Road Transport Union

[8] Forum Systèmes & Logiciels pour les NTIC dans le transport

3.3 Dissemination activities

The dissemination strategy has been described in details in deliverable 7.2. Nonetheless the following chapters summarize and provide an updated outline of that strategy, in accordance with the feedback received on the preliminary version of the present deliverable.

The core of that strategy is the various channels and media selected to be used in the project for dissemination & exploitation purposes, according to the intended audience or target group(s).

The following table presents an overview of the different proposed media for disseminating the project results:

Target Group / Tool	EC	Public authority	Industry	Research sector	General public	Standardisation bodies
Website	x	x	x	x	x	x
Social networks			x	x	x	
Deliverables - public	x	x	x	x	x	x
Deliverables - restricted	x					
Technical & Scientific Publications			x	x		x
Dedicated workshops	x	x	x	x		x
Trade shows and technical fairs		x	x			
Presentations at external events	x	x	x	x		x
Audiovisual media	x	x	x	x	x	x
Printed materials	x	x	x	x	x	x
Printed & online press	x	x	x	x	x	x

On top of these, one should not overlook the partners themselves as a key channel to their own stakeholder networks, including political spheres at European and national level, and a direct link to their corporate business and operation development and product planning. For example, TNO is a central partner in many national and EU-wide smart mobility programmes, and also partner of hundreds of smart mobility SME's in the area of mobility and ICT. VTT has been making a smart city roadmap for the city of Helsinki, utilizing the findings and results in Instant Mobility.

3.3.1 Instant Mobility identity

Before any communication can be properly executed, a visual identity needs to be developed that reflects the project vision and key concepts and creates an easily recognisable “image” to improve the project visibility.

Such visual identity is defined by the project logo that is used prominently in all dissemination tools and printed materials.

The Instant Mobility logo has been created; colour as well as black & white versions have been provided, in several resolutions to meet all dissemination purposes.

Figure 2: Instant Mobility logo

3.3.2 Instant Mobility website

The Instant Mobility website is the main tool to promote the project results, especially to the non-expert community or general public.

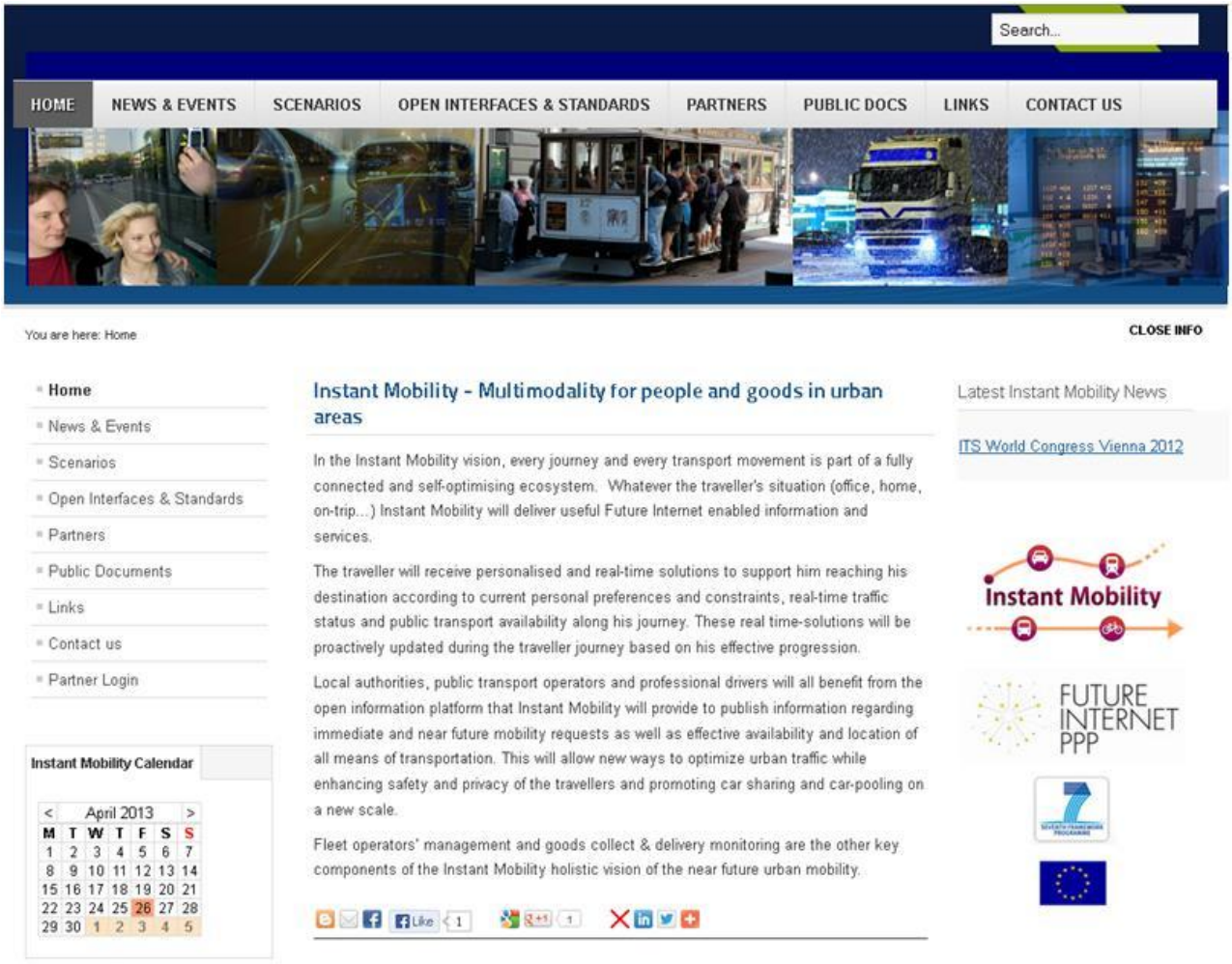


Figure 3: Instant Mobility homepage

It is meant to be a dynamic database compiling the project latest developments, Instant Mobility public documents as well as scientific, standard and market information relative to the Instant Mobility context.

The following domain names had been secured from proposal stage and are linked to the same page:

- www.instant-mobility.eu
- www.instant-mobility.org
- www.instant-mobility.com

All partners have the possibility for to publish latest information in order to ensure the up-to-date 'living' information sharing between the project and the external actors.

Link is made to the Instant Mobility groups on social media like Facebook, Linked-in and Twitter (see chapter 3.3.3) to keep a fast-moving flow of project news moving out to various online communities, including stakeholders outside the consortium and especially the end user.

The website was launched in April 2011. Events, reports and all public deliverables have been continuously added to it. There has been 43 953 visitors between June 1st 2011 and March 18th, 2013. The most popular pages have been Scenarios description, News, Standards and Participating Cities.

The website will remain online, and its content available, until 2016. The website will constitute a repository for the project conceptual prototypes (another one will be CONCORD website, which aims to collect and make available all results from Phase I UA projects).

3.3.2.1 Structure

The Instant Mobility web portal is structured as following:

- **Home** (summary describing the vision, context and audience of the Instant Mobility project)
- **News**
- **Scenarios**

  The "Scenarios" page includes description and latest information related to the following lead scenarios:

  - **Personal travel companion**
  - **Smart city logistics**
  - **Transport infrastructure as a service**

- **Open Interfaces and Standards**

  The purpose of the "Open Interfaces and Standards" page is to (i) list the standardisation issues targeted by the Instant Mobility project and (ii) to present the forecasted enablers and functions related to open interfaces.

- **Events** (up-coming as well as past events related to the Instant Mobility project)
- **Partners** (information about the Instant Mobility consortium partners including the logo and link to the homepage of each partner; in addition, the associated partners are also listed)
- **Public Documents**

  All the public documents (e.g. brochure, press releases, deliverables) produced during the project will be added into the "Public Documents" page. In addition, a link (if publicly available) or reference information of each presentation or scientific article will be added.

  This page has two sub-pages:

  - **"Instant Mobility in the Press"** is for links and notifications of Instant Mobility project in public media
  - **"Public Deliverables"**

- **Links** (to the related relevant initiatives/organisations such as participating cities as well as Future Internet and ITS-community programmes including national and international)
- **Contact information** (of the Coordinator)
- **Blog**

  The blog exists on Wordpress: (http://fiformobility.wordpress.com/) and is linked to the Instant Mobility webpage. Each partner can send plain or formatted text (e.g. in html format) to the blog by sending email to the address provided by VTT for each partner.

3.3.2.2 Partners' corporate websites

Partners are encouraged to publish project-related information on their own organisation website, through either a dedicated page or news about the project progress and activities (such as workshop announcements, etc).

For example, in the area "Projects/International activities" of ATAC public website, a short description of the project is published in both Italian and English versions with the link to Instant Mobility website.

On top of that, the user survey launched by WP6 (see chapter 4.1.3.1 for more details in relation) in March 2012 was announced on the homepages of the participant cities and local traffic operators websites.

3.3.3 Social networking

Instant Mobility intends to make use of social media to share information on e.g. the upcoming events, distribute the online questionnaires of the user surveys and open discussions on relevant topics, by the widest audience possible and especially to try and reach the end user.

These more recent communication channels are becoming more and more common practice in research dissemination; several FI PPP projects already have such tools in place and it is even suggested to have a news feed synchronised at programme level (CONCORD website).

Here are the links to the specific Instant Mobility pages/groups on the different social media:

- https://www.facebook.com/pages/Instant-Mobility/160241434096621
- http://www.linkedin.com/groups/Instant-Mobility-4350665

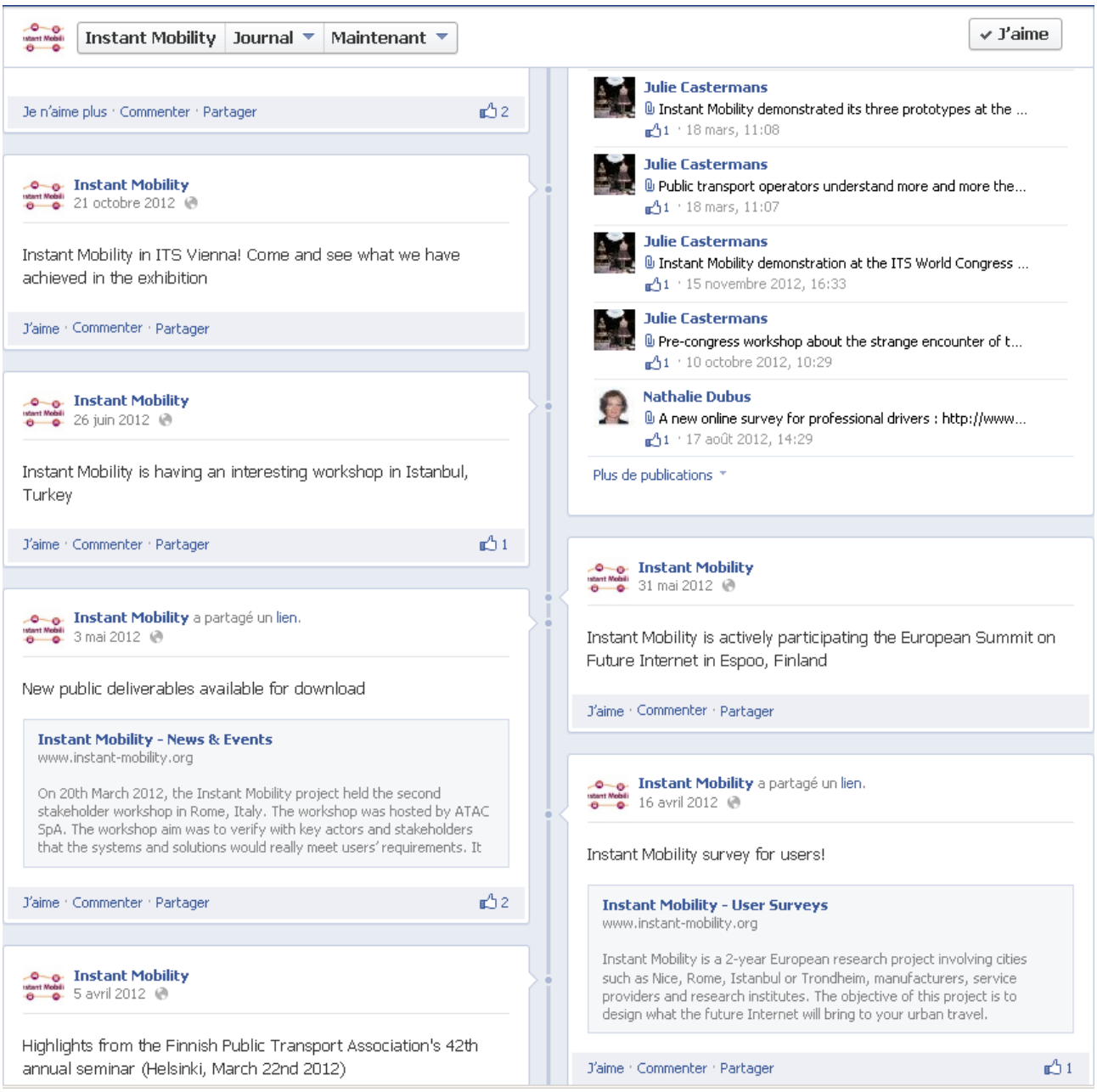


Figure 4: Instant Mobility Facebook page

Partners are encouraged to join these groups even though some company policy may not allow it, so the names of the participating organisations are not mentioned on these pages.

For exploitation purposes, it is all the more relevant that the project should be present from the start on these media, to familiarize the end user with those future applications, that the ride sharing scenario is based on requests and offers exchanged through social networks (namely for traveller's rating).

3.3.4 Print materials

An Instant Mobility Leaflet was produced in Month 6 that describes in a concise manner the project main objectives and expected outcomes, but also introduces the consortium, contact information and funding schemes.

It is meant to be freely circulated for project information and promotion at workshops, trade shows, technical fairs, congresses and other events. The electronic version of these materials will be downloadable from the Instant Mobility website.

An update of the brochure was produced for the ITS World Congress in Vienna (October 2012), in which mainly the scenarios description was updated, i.e. the initial five were converted into three.

Other materials such as posters for accompanying the prototypes demonstrations were produced for the ITS World Congress in Vienna (October 2012) and also used at the Mobile World Congress and FI-PPP event in Barcelona (February 2013).

3.3.5 Audiovisual material

The project produced a video composed of three "clips" that present real-life examples of Instant Mobility-enabled innovative services, using actors to interpret the scenarios, which partners contributed to writing and are derived from the project three main scenarios, i.e. the travel companion, smart city logistics and transport infrastructure as a service.

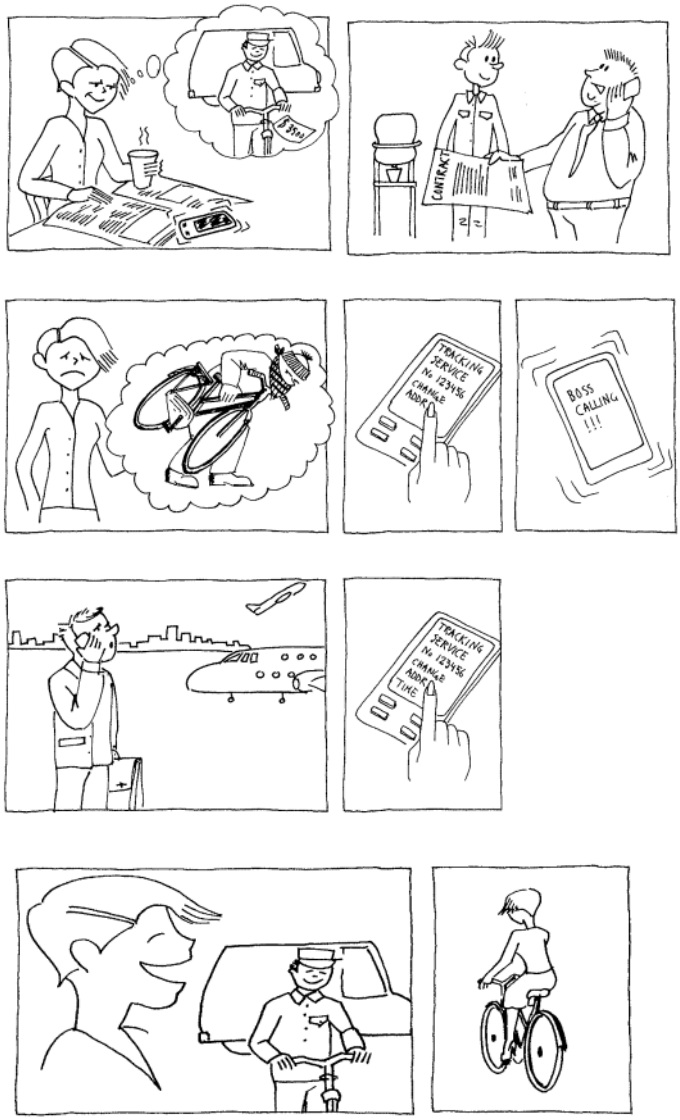


Figure 5: First sketches for the scenario 2 video clip

+A first release of the video was prepared for the Mobile World Congress/ FI-PPP event in Barcelona, before the video was further edited to add subtitles and adapted for a player allowing to watch either the clips separately or all together as one video.

The video is posted online on the project website and social media pages, the FI-PPP/CONCORD website and social media but also external channels such as U-Tube.

In addition, the scenario 1 prototype demonstration in the ITS World Congress in Vienna was filmed, including the audio explanation of the demonstration presenter, and the video was posted on the Instant Mobility website.

3.3.6 Newsletters

Instant Mobility has contributed news to the CONCORD FI project website and newsletter (CONCORD Snack) that reports a collection of latest news and achievements within the FI community and related initiatives. This monthly electronic newsletter is forwarded to community partners who sign up for the newsfeed.

More specifically, Instant Mobility contributed to the following issues:

- July 2011: about Toledo city becoming an official partner of Instant Mobility
- September 2011: to announce the stakeholder workshop in Brussels on 28 October 2011 and the Special Session on Future Internet organised by the project at the ITS World Congress in Orlando on 18 October 2011)
- November 2011: to report on the feedback received at the ITS World Congress and at the Stakeholder workshop in Brussels
- February 2012: to announce the stakeholder workshop in Rome on 20 March 2012
- April 2012: report on the stakeholder workshop in Rome (a second article was submitted on preliminary results from the user surveys, which has been kept for the May issue)
- May 2012: to announce the preliminary results of the acceptability study
- July 2012: to report on the stakeholder workshop in Istanbul (June 2012)
- September 2012: to announce Instant Mobility planned activities at the ITS World Congress in Vienna as well as the launch of the online survey for professional drivers
- November 2012: to report on the stakeholder workshop and the scenario 1 prototype demonstration organized in the ITS World Congress in Vienna (October 2012)

Thales contributed to an article in the CESAMES (Center of Excellence on Architecture of Systems) Newsletter issue of February 2012, about the architecture of systems applied to the transport sector, in which framework they introduce the project, its objectives and main expected outcome.

In addition, some Instant Mobility partners are using their corporate newsletter to disseminate the project expected results and benefits that their organisation could gain from being in the project:

- Dedicated Orange Business Newsletters for B2B communication (weekly and monthly newsletters)
- Swarco Mizar has contributed an article regarding the implementation of Scenario 3 in Trondheim test site to the ERTICO website and iMobility newsletter (February 2012)
- ERTICO is publishing in their web news the articles either sent by partners (example of Mizar) or submitted to the Snack newsletter, which in turn are included in the monthly issue of the iMobility Network (independent knowledge exchange platform for all aspects of ITS) newsletter, distributed to a mailing list of around 30.000 recipients

- The announcement of the Rome Stakeholder workshop in March 2012 was published in the February 2012 issue of TTS Italia Italian/English newsletter as well as on TTS Italia web site
- Instant Mobility has been presented in the Telecom Italia corporate newsletter by Research and Prototypes department inside Telecom Italia
- On 9 April 2012, a short note about Instant Mobility was published in "Diario Telefónica", Telefónica group internal electronic newspaper (audience: Global Telefónica Group); and a dissemination article providing overview of Instant Mobility and its scenarios was published in Telefónica Product Development and Innovation Intranet (August 2012 - audience: Telefónica PDI employees)[9]
- IFFSTAR published a project descriptive in the first issue of their three-monthly magazine Trajectoire in April 2012

3.3.7 Press

The press is a crucial tool to diffuse information about Instant Mobility to a wide range of stakeholders including the general public.

A press release was issued and a press conference organised at the Kick-off meeting in Nice, France, with a speech by the Mayor[10] and presence of local media and TV (France 3), while other partners such as for example Orange and Telefónica I+D have issued corporate press releases about their participation in the EU FI-PPP programme and specific projects, including Instant Mobility.

ATAC has explored through the appropriate internal channels the possibility of communicating the project to local/national newspapers, when opportune. For example, ATAC promoted the Mobile World Congress/FI-PPP Event, Barcelona, 28th February / 1st March 2013 (which was also Instant Mobility external final event) through a press release, published in its official website, in its intranet, and sent to several press agencies (see Annex V of this deliverable).

DHL is periodically informing their media agency to disseminate the project progress and activities, and issued a press release about their participation in the project at the occasion of the consortium meeting organised in Madrid in December 2011. Hereunder are the various publications where it was relayed:

- "DHL Supply Chain participa en el proyecto Instant Mobility" (ALIMARKET, 13 December 2011)
- "DHL aporta su know how al desarrollo de nuevas aplicaciones web de distribución urbana" (Diario del Puerto, 16 December 2011)
- "DHL Supply Chain presenta el proyecto de innovación tecnológica Instant Mobility" (Economia de hoy, 19 December 2011)
- Ejecutivos.es + @ejecutivos.es twitter account, 19 December 2011
- El Molinillo de la Innovación, 19 December 2011
- El Portal del Transporte y la Logística, 21 December 2011
- Masterline International Transport & Logistics, 16 December 2011
- Noticias.info, 16 December 2011

[9] The article was relayed by an external publication: http://www.rcysostenibilidad.telefonica.com/blogs/2012/04/09/telefonica-id-facilitara-a-las-smart-cities-un-sistema-de-movilidad-ecologica/

[10] Moreover the Mayor and other elected board members of the Metropolis always quote the project in their speeches when the topic is about NCA smart city programmes.

- “Presentan el proyecto europeo Instant Mobility para la mejora de la movilidad de mercancías y personas” (Nexolog.com, 21 December 2011)
- “Instant Mobility, un paso hacia el futuro de la optimización urbana” (Nexotrans, January 2012)
- “Instant Mobility: optimizar la movilidad en las ciudades con las funcionalidades de un smartphone”(Periodistas en español, 17 December 2011)

ISBAK issued a press release at the occasion of the stakeholder workshop organisation in Istanbul on 26 June 2012, which was relayed by several online publications:

- http://www.zaman.com.tr/haber.do?haberno=1310057
- http://www.haberler.com/isbak-avrupa-nin-its-devlerini-istanbul-da-3740493-haberi/
- http://www.ajans5.com/detay/2012/06/27/isbak-avrupa-nin-its-devlerini-istanbul-da-agirladi.html
- http://www.habertv.org/isbak-avrupa-nin-its-devlerini-istanbul-da-agirladi.html
- http://www.timeturk.com/tr/2012/06/27/isbak-avrupa-nin-its-devlerini-istanbul-da-agirladi.html
- http://yurthaber.mynet.com/yorum/liste/297466
- http://www.yenieksen.com/haber/guncel/isbak-avrupanin-its-devlerini-istanbulda-agirladi/65000.html

The same is valid for the City of Toledo when they organised a press conference with the city Mobility Counsellor, Rafael Perezagua and Instant Mobility coordinator on 3 October 2012:

Figure 6: Press conference in Toledo on 3 October 2012

- http://www.ayto-toledo.info/index.php?option=com_content&task=view&id=8839&Itemid=1
- http://www.ayto-toledo.info/index.php?option=com_content&task=view&id=6493&Itemid=71
- http://www.latribunadetoledo.es/noticia.cfm/Local/20110726/toledo/participa/programa/europeo/mejorar/movilidad/D7AE291A-C302-6F55-411D57B9D6C1E25E
- http://www.abc.es/20110726/toledo/abcp-informacion-para-moverse-toledo-20110726.html
- http://www.globalclm.com/j-toledo/j-toledo-capital/711479--la-ciudad-de-toledo-aprueba-su-adhesion-el-programa-europeo-instant-mobility
- http://www.alicante.ciudadred.es/1072/toledo/11886-la-ciudad-de-toledo-aprueba-su-adhesion-el-programa-europeo-instant-mobility.html
- http://www.abc.es/20110811/toledo/abcp-toledo-adhiere-programa-europeo-20110811.html

- http://www.latribunadetoledo.es/noticia.cfm/Local/20110811/ciudad/toledo/aprueba/adhesion/programa/europeo/instant/mobility/0F65F5AD-DD9A-C8AE-2BE8F7946C3A86DC
- http://www.toledovirtual.eu/news/view/el_alcalde_de_toledo_asegura_que_el_gobierno_municipal_trabaja_intensamente_para_que_la_ciudad_se_s
- http://www.lacerca.com/noticias/toledo/aplicacion_programa_movilidad_toledo-116466-1.html
- http://eldiadigital.es/not/51438/toledo_avanza_en_la_aplicacion_del_programa__instant_mobility_/
- http://www.ayto-toledo.info/index.php?option=com_content&task=view&id=7983&Itemid=158
- http://lasagra.portaldetuciudad.com/es-es/noticias/toledo-el-gobierno-municipal-avanza-en-la-aplicacion-del-programa-de-movilidad-instant-mobility-lasagra-006_1_1_314105_46.html
- http://www.teletoledo.es/noticia.php?id=3462&no=El%20gobierno%20municipal%20de%20Toledo%20avanza%20en%20la%20aplicación%20del%20programa%20de%20movilidad%20Instant%20Mobility
- http://www.abc.es/20120430/toledo/abcp-toledo-avanza-conocer-estado-20120430.html

3.3.8 Articles

Scientific & technical papers submitted for presentation at conferences & events (see chapter 3.3.9) were published in these conferences proceedings, but no opportunities for publishing them in technical and scientific journals and magazines could be found according to the following publications editorial calendars.Examples of professional and technical magazines and journals in this field include:

- Thinking Highways
- ITS International
- Transport Technology International
- IEEE ITS Newsletter
- Traffic Engineering & Control
- Transport Business International
- Eurotransport
- Les Cahiers de la ville responsable
- Acteurs urbains

3.3.9 Participation in external conferences and events

Personal contacts and presentations through attendance at relevant workshops, trade shows, technical fairs and other conferences are ranking top of the list of most popular channels used for the dissemination of project results.[11] Networking remains a crucial way to share and exchange professional experiences and keep informed about latest research developments.

11 Source: IPR Helpdesk - Dissemination of Foreground under FP7 (http://www.iprhelpdesk.

A calendar of relevant events in which the Dissemination Manager encourages Instant Mobility partners to participate and/or present the project is included in Annex III of this deliverable. It includes indications of relevance for the project and interest of partners or actual undertaking such as papers submitted.[12]

3.3.9.1 ITS World Congress in Vienna, 22-26 October 2012

ITS Vienna was selected as the most important dissemination forum in 2012 and identified as a key milestone already in the original Description of Work. The dissemination activities of Instant Mobility in Vienna included:

- 2 technical papers approved
  - "Future Internet for a Personal Travel Companion service"
  - "Architecture methodology in the Instant Mobility project"
- dedicated Special Session on the topic of multi-modal travel (organised jointly with EC project Viajeo)[13]
- pre-conference stakeholder workshop targeting the ITS and FI communities
- demonstration of the scenario 1 prototype in the exhibition

There has been an open call for proposals in the consortium to select the best idea(s) for demo prototypes for ITS Vienna; proposals were ranked by key criteria such as feasibility, cost and functional/ technical challenges.Eventually it was decided to focus only scenario 1 prototype for this event and leave other prototype demonstrations for the final event (which turned out to be the FI-PPP-organised large-scale event in conjunction with the Mobile World Congress in Barcelona, in February 2013).

org//documents/ES_DisseminationForegroundFP7_0000006629_00.xml.html), page 28

12 A list of all events actually attended by partners for disseminating the project during the first year is also included in Annex II.

13 Another partner was also invited to present in another Special Session on social media (see Annex II)

Figure 7: Scenario 1 prototype demonstration at ITS World Congress in Vienna

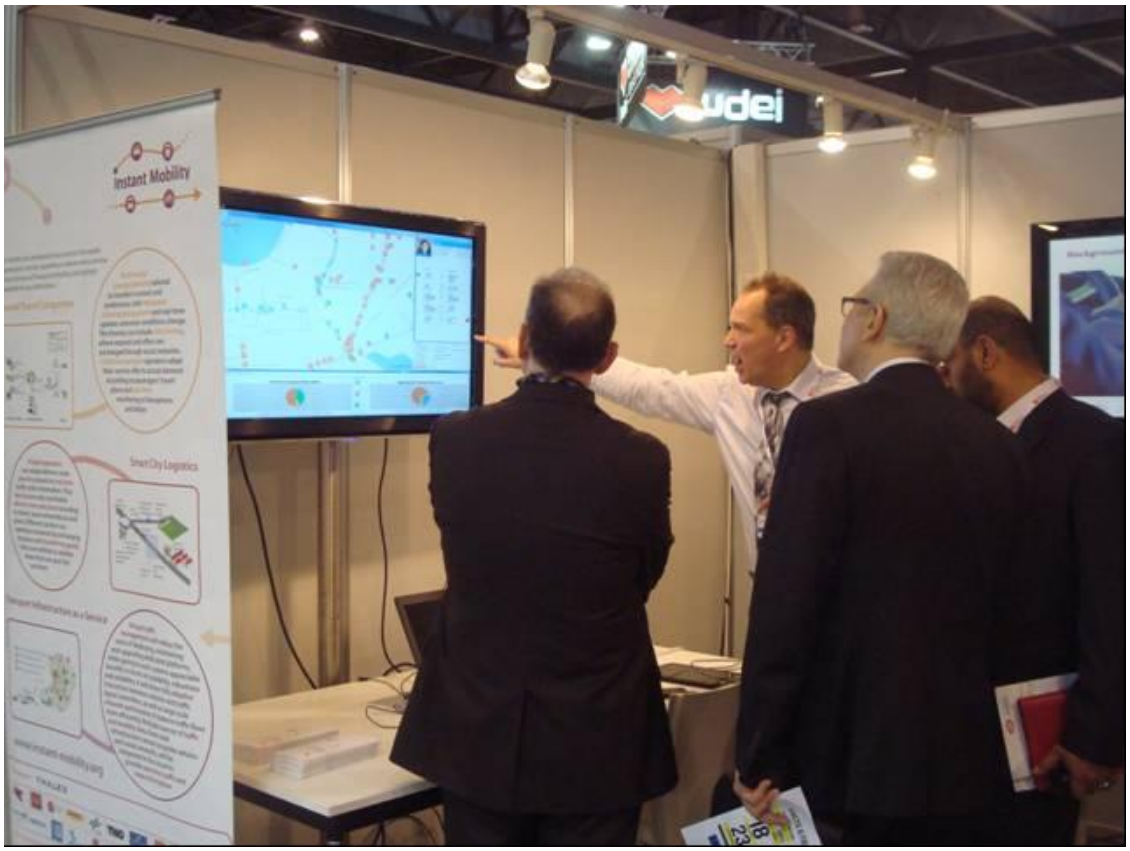
3.3.9.2 Mobile World Congress 2013 and FI-PPP Event in Barcelona, 25 February-1 March 2013[14]

The final event of the FI-PPP-programme (Phase 1) was organised in conjunction with Mobile World Congress 2013 in Barcelona (25-28 February), on 28 February - 1 March 2013, with the aim of engaging stakeholders such as SMEs, developers, cities, regions, industry and end-users, and raise their awareness of all the possibilities to participate and benefit from the FI-PPP.

Instant Mobility, one of the usage area projects of the Phase 1, representing the transport and mobility use cases, demonstrated its three scenarios on multimodal journey planning, urban freight delivery and traffic management in the cloud. The event also included a conference and workshops to communicate and discuss the results of Phase 1 results and explain the benefits in different application domains of this new business ecosystem based on open interfaces, enabling third party services and applications to emerge and develop into new markets.

The Future Internet PPP was also present at the Mobile World Congress 2013 exhibition area, with multiple demo slots and possibility to directly engage with all the projects and the programme.

The Scenario 1 “Personal Travel Companion” demonstrator simulated in a realistic way, the urban and suburban trips in the city of Bordeaux, based on the population's movement statistics. The city map displayed the live positions of buses, travellers and cars and the journey details of each traveller can be obtained in real time. The demonstration also showed the dialog between a traveller and a car driver involved in a common ride.



[14] More details on the prototypes themselves, which were demonstrated in Barcelona, are available in chapter 5.2.5.

Figure 8: Scenario 1 prototype demonstration at Mobile World Congress in Barcelona

The Presentation of the Scenario 1 prototype, showing the provision and monitoring of the multi-modal travel in real-time, was done on 25 February 2013 from 9:00 to 12:00. It allowed Thales (as scenario 1 leader) to show the results of the extended prototype shown in Vienna, including the completed Valeo Car Computer prototype run under Mirror Link and the Traveller mobile implementation. These three components taken together were demonstrating the feasibility of the intended large scale monitoring of travellers in real-time. More precisely, the demonstration is dealing with 520 thousands of individual travels during a typical business day in the city of Bordeaux. This translate into the simultaneous monitoring of roughly 5000 cars and 6000 travellers during peak hours, while the city 300 buses are at the same time monitored.

Considering that the demo slot on the FI-PPP booth for Scenario 1 and 3 was in the opening hours of the Mobile Congress week, there was a limited number of visitors passing by, however they were all very impressed with the results shown, even if most of them were not potential stakeholders or related to stakeholders.

The same prototype was shown at the end of week during the FI-PPP event and met a very strong success with about 50 different visitors during the two days. Overall about five really interesting and focused contacts have been made and are currently followed up within Thales: e.g. a very good contact was established with someone working on a somewhat related European Project Airports Hubs and a potential collaboration is being studied.

The Scenario 2 “Smart City Logistics” demonstrator showed how customers could get their goods delivered at a time and place customized to their needs, by sharing with the transport operator information on their whereabouts and plans.

Figure 9: Scenario 2 prototype demonstration at Mobile World Congress in Barcelona

The Scenario 3 “Traffic control in-the-cloud” demonstration simulated traffic control operations are hosted in the Internet in secure virtual traffic signal controllers and a virtual traffic centre. The system was able to automatically detect critical traffic conditions and to activate dynamic green

waves and selective priority policies, to keep the network under equilibrium conditions. Virtual components and data are accessible anywhere to authorised personnel and give to the system high scalability and cost-effective configuration, maintenance and upgrading possibilities.

In the two exhibitions (Mobile World Congress and FI-PPP Large Event), a local implementation of the prototype had been installed, keeping communications at a local level in order to satisfy all the requirements needed and to speed up the configuration of the demonstrator (essential when many demonstrators are involved – e.g. in the MWC 2013 FI-PPP booth in Barcelona), but without changing the well-known concept of traffic control in-the-cloud.

At the FI-PPP Large Event, the audience was much more interested in FI technology and partners had the possibility to discuss with different types of stakeholders about the innovations to be taken in the next years in traffic management and control, with particular reference to the concept of traffic control in-the-cloud we presented.

Figure 10: FI-PPP Event in Barcelona (March 2013) - "Traffic control in-the-cloud" demonstrator

As a conclusion, while the Mobile World Congress and FI-PPP event were probably not as focused as the ITS World Congress in Vienna, we were able to confirm there the soundness and originality of our prototypes.

3.3.10 Open workshops[15]

Workshops were organised to present project results (even preliminary ones) to invited actors of the Transport and Mobility ecosystem, including our associated partners (see chapter 3.2.1.), but more importantly to engage with external stakeholders in order to re-adapt regularly the project

[15] Detailed minutes of the workshops are available with the presentations on Instant Mobility website, but the results, main topics of discussion and issues raised during these workshops are also summarized in deliverable D7.8.

focus and make sure to meet the most important challenges for the Instant Mobility *Community*. To this end, namely the other UA projects have been involved and encourage to invite their own stakeholder community to broaden the spectrum even more. In this sense, joint workshops with other UA projects or inviting speakers from these projects in the programme on Instant Mobility workshops were also encouraged.

These workshops were organised around key topics corresponding to the major outputs of the project and managed as an iterative loop with the stakeholders from functional definitions of multimodal services to Future Internet specific and generic enablers' features.

They ensured the involvement of stakeholders in the different phases of the project and will be targeted at both participating cities, local stakeholders and the broad ITS community, with a view to phase 2 and 3 of the FI PPP programme.

It has been decided schedule these workshops as much as possible within the frame of other major outreach events, such as Future Internet Assemblies or European and World ITS congresses, or in conjunction with the project consortium meetings taking place in partner cities.

3.3.10.1 Stakeholder Workshop, Brussels, 28 October 2011

The first workshop was organised in co-operation with WP3 in Brussels on 28 October 2011. The workshop gathered around 40 participants, and included roundtables with the participant cities about the current issues they are facing in the area of transportation and related information services, and how they perceive Future Internet could help them find solutions. In addition, the preliminary scenarios developed in WP3 were presented and actively discussed with the audience. The findings of the workshop were found extremely useful to further elaborate the scenarios. The feedback from the participating cities is summarized in chapter 4.1.1.

Figure 11: Cities round table at the first statekholder workshop in Brussels

3.3.10.2 Stakeholder Workshop, Rome, 20 March 2012

The second stakeholder workshop was held in Rome in conjunction with the scheduled consortium meeting, as recommended by the Reviewers. All together 85 participants registered to the

workshop organised in ATAC premises. Very informative presentations were given by European Commission (Peter Fatelnig), Telecom Italia (Andrea Bragagnini) and ATAC (Luca Masciola). In addition, the new (3) scenarios created and iterated in WP3 were presented to open the discussion with the audience. In addition, the preliminary results of social acceptability and business modelling (methodology) activities in WP6 were presented. The bulk of discussions is summarized in chapter 4.1.1.

Figure 12: Second stakeholder workshop in Rome

3.3.10.3 Stakeholder workshop, Istanbul, 26 June 2012

The third stakeholder workshop was organized in Istanbul in connection with the June 2012 consortium meeting. The stakeholder workshop took place in central Istanbul, and gathered altogether 57 participants, of which majority were local stakeholders.

The workshop was targeted specifically at comparing the needs of the multimillion city of Istanbul and the possibilities Future Internet services have in such an environment.

The workshop started with two local presentations by Istanbul Metropolis Municipality (Director of EU relations) and ISBAK (Director General). Transport issues are seen as one the most important problems in the Istanbul metropolitan area. ISBAK is one of the key players in transport sector, having good cooperation between universities, SME's and industry. ISBAK has currently traffic management systems, and also information/monitoring systems to make the traffic more intelligent and to target the traffic related problems.

Figure 13: ISBAK Director General

These presentations were followed an introduction to the FI-PPP programme and its opportunities, as well as to the Instant Mobility project, by the project Coordinator. Each scenario was also presented and followed by questions and answers sessions.

To follow, a presentation clarified “What is Future Internet” and the audience was also introduced to the possibilities “Future Internet enablers” are providing.

To concluded, the project Coordinator also gave an overview of the Phase 2 call opportunities for SMEs to push new innovative services with large funding available.

Finally, and before an open panel discussion with key stakeholders from the audience, ISBAK gave a presentation of “Istanbul as a pilot city” in the project, highlighting the biggest challenges and needs in Istanbul transportation system in general, but also presenting the results of the acceptability survey organised in the city.

3.3.10.4 Pre-ITS World Congress workshop, Vienna, 21 October 2012

The workshop in Vienna was the opportunity to present the preliminary results−before a final workshop to present the final results towards the end of the project−of the enablers’ specifications, business cases and user surveys feedback to the ITS stakeholder Community.

The reason to have the workshop in connection to the ITS World Congress is that it is seen as a meeting place for the ITS community, from public authorities, government, policy makers to industry, service providers and users. So ITS (“connected data”) touches everybody. Future Internet will not be radically different from today but much better, i.e. new ways of using Internet and its technologies, and it is becoming a founding technology for transport and mobility. Instant Mobility within the FI PPP program is the only usage area project with a stronger focus on transport and that includes cities as partners.

A second purpose was to facilitate and enhance synergies with other projects of the FI-PPP programme by inviting them to present their own activities in the workshop agenda.

After an overview of the FI-PPP-programme presented by Arian Zwegers from the European Commission, CONCORD and Infinity both presented their role and activities in the programme. Telefónica I+D presented FI-WARE before a representative from ATAC (Rome) presented the view from a city that can use the services developed in Instant Mobility.

Other UA projects were also presented, e.g. FINEST, OUTSMART and FINSENY, before Instant Mobility presented an overview of the project objectives and results so far, including the three scenarios (and the prototype from scenario 1 to be demonstrated during the Congress itself), the business cases, standardisation and acceptability surveys results.

Figure 14: Pre-ITS Vienna Congress workshop

In addition it was planned to organise a local stakeholder workshop in Toledo (in conjunction with the consortium meeting), even if close to the planned Vienna workshop, since the targeted audience was different (wider international ITS community in Vienna). However Toledo city authorities preferred to organise a restricted meeting of interested representatives of local businesses and agencies involved in mobility and transport services management, from local police and firemen, to hotels and parking managers. This meeting was followed by a press conference and only the project Coordinator was invited to participate.

3.3.10.5 Partners' corporate events

Partners will present the outcomes of the project (including conceptual prototypes) to their own business clients and local or national stakeholders during commercial meetings and/or showcases organised by their own organisation.

For example, VTT has organised two events in September 2011:

- the first one included representatives of Ministry of Transportation and Communications, City of Tampere and Finnish Transport Agency, and focused on the development of a roadmap for innovative transport system operation services.

  The services to be selected should provide new opportunities for export and domestic business for Finnish companies as well as provide clear added value for the transport system operators. The novelty of the services will probably be linked to the increasing importance of travellers and haulers as new stakeholders in the actual operation of the transport system due to the advent of the cooperative and social media applications which will revolutionise the content and organisation of service in transport;

- the second workshop concentrated on the user-centred approach of the traveller information services, and potential of the new technologies in the area of (train) traveller information services.

In addition, Nokia and Telecom Italia have been organising internal meetings to raise awareness of Instant Mobility project and its exploitation, with the purpose to understand the usability of IM results in other EU projects or future proposals, but also to present the project to top clients, in particular Turin municipality and local public transport operator.

3.3.11 FI PPP programme

The Programme in itself is used as a channel for dissemination, especially through the collaboration with the CONCORD Support Action and liaison with other UA projects. The details of these specific interactions and contributions from Instant Mobility can be found in chapter 4.1.2.

4. Section II – Pathway to exploitation

"*The Internet of Things holds the promise of significant progress in addressing global and societal challenges and to improve daily life. It is also a highly promising economic sector for sustainability, growth, innovation and employment. But it is likely to have a profound impact on society, in areas like privacy, security, ethics, and liability. The policy challenge is to assess the right trade-off between the potential economic and societal benefits and the control that we want to retain over an environment where machines will gather, exchange, process and store information automatically. The effects on our private and public space require that people and their governments debate the appropriate governance and management of the Internet of Things in the future.*"[16]

4.1 Key aspects

The strongly complementary expertise and multi-disciplinary nature of the Instant Mobility consortium is a real added value for the project, which will investigate the complementarity of Future Internet Technologies and Transport and Mobility challenges from different perspectives: technical, business and societal.

This involvement and cooperation of major industrial players in Europe, often competitors, is a clear evidence of their belief in the project's strategic importance for their business activity. The involvement of major EU mobile network operators is particularly important for a relevant and concerted European dissemination of Future Internet technologies. A consistent representation of several transport sector companies shows a strong commitment towards the application of Future Internet technologies as embodied by the Instant Mobility objectives, and the belief that these are crucial for a new wave of green and sustainable services in urban areas.

Within the Instant Mobility project's development team are a number of important potential users and suppliers of Future Internet-enabled transport and mobility solutions. These include some of the largest companies amongst Europe's manufacturers of private cars, trucks and buses and automotive components; of traffic management systems; of mobile handsets; and of public transport and security systems. As these are also the developers within the project of IPR including system specifications, advanced software and conceptual prototypes, it can be expected that they are making an investment in advance of future market development, and will seek to use the project's results for their business after the end of the project term.

Moreover the expected impact of the project results will be strengthened by certain *activities or tasks of the project*, which have strong interactions with exploitation, as they set in place or investigate key mechanisms (enablers or showstoppers) for successful deployment and adoption of the *key results* coming out of Instant Mobility: i.e. programme collaboration within WP2, innovative technology, application and service concepts from WP3, societal issues and business cases analysis within WP6, and the realisation of a prototype, namely for demonstration, and of a detailed implementation plan for Phase II in WP5.

This wide perspective, seeing a comprehensive solution to a related group of specific and local problems, will pave the way to identify the real limitations of current isolated approaches in the ICT and Transport and Mobility domains, as well as the realistic future steps that will have a chance to gain a wide acceptance by the market and the citizen.

[16] European Commission public consultation on the «Internet of Things» http://ec.europa.eu/yourvoice/ipm/forms/dispatch?form=IoTGovernance

4.1.1 Participation of Cities

The contribution of Cities, within different urban contexts, is also a significant aspect and positive sign for exploitation as they are interested pilot candidates for real-life implementation of Instant Mobility services in Phase II of the FI PPP Programme.

Their participation in the consortium (and/or associated partnership) is also a huge asset for specific activies of the project, such as the acceptance studies or the stakeholder workshops for example, as they integrate citizens' and customers' point of view.

The first stakeholder workshop (Brussels, 28 October 2011) brought together representatives from the cities of Rome, Toledo, Istanbul, Trondheim and the Spanish Basque Region. The second workshop (Rome, 20 March 2012) was targeted at local and/or national stakeholders, and so will the following ones in Istanbul (26 june 2012) and Toledo (October 2012).

Their main challenges for urban mobility identified by our partner Cities are congestion (and its environmental and economic impacts) and the need to shift the balance from individual to collective transport modes. But also road network optimization and reduction of the need for new infrastructures are seen as other benefits Instant Mobility solutions could bring to concreted issues of the Cities. Efficient and sustainable management of goods distribution and commercial vehicles inside the cities, seamless and single ticketing, smart parking services (e.g. Park & Ride) and the lack of reliable online information and dynamic event management across transportation modes are also common issues.

Existing tools available in the partner cities all lack the "dynamic" aspect, whether for multimodal travel or ride sharing services, and are also not "integrated" in terms of different modes but also with booking and billing means. Moreover public-private partnership is considered a pre-requirement to any investment in such technologies, which Instant Mobility consortium is representative of. Once operational, these solutions are seen as self-funding through an increase in public transport ticket sales and cost savings implied directly (e.g. ride sharing) or indirectly (e.g. reduced fuel consumption) by the applications.

Generally acknowledged is the need for infrastructures for data centralization from the different modes and from several sensors, but also the ability to compute that data to provide intelligent information to citizens along their journey. Other questions posed by the future use of such systems, which needs to be addressed, include heterogeneity, financial implications of security or licensing, legal implications of proprietary systems and political support from European authorities.

The concept of "Smart Cities" in general represents an opportunity for Instant Mobility services, as it supports local governments in implementing e-enabled public services to support socio-economic development and environmental sustainability. For example, Orange launched a worldwide programme around Smart Cities with three majors axis,utilities, energy and transport, in which they have integrated Instant Mobility as one of the main research projects for urban transport.

The suitability of the partner or associated cities – Rome, Istanbul, Nice, Trondheim and Toledo – to implement Instant Mobility services has been investigated in Instant Mobility deliverable D5.4, including detailed information on their transport and mobility context.

4.1.1.1 Rome

Main transport and mobility issues

- Congestion due to the fact that Rome is a capital (urban development) and historical city (constraints due to topography and limitations on infrastructure improvements), and the use of private cars as preferred transport means;
- Greenhouse gas emissions rate, imputable to the transport sector, which is significantly higher than that of other European capital cities such as London, Paris and Madrid, due to the high proportion of vehicles within the city, mostly private cars and motorcycles;

Why Instant Mobility

Convincing a significant number of people to leave their car in favour of modes of transport with low environmental impact or shared with other users, is a complex matter which requires an *innovative* approach both in terms of *technological* and *social* aspects.

Some sector studies estimate that the effects of a widespread introduction of technology systems for traffic monitoring and information would provoke a reduction in traffic congestion of 40%

More specifically:

- Public transport services that offer flexible levels of accessibility and comfort close to individual transport: bus services on demand, car sharing, car-pooling, etc;
- The city would benefit from the implementation of a centralised system for directing vehicles to the various Park&Ride areas. These systems would allow an interaction between the “offer” (number of available parking spaces) with the “demand” (historic traffic flows and forecasts of utilisation of the same parking lot), so to guide the driver to the most appropriate place where he could leave his vehicle and continue the journey with public transport;
- Integrated ticketing solutions would allow the global management of an itinerary based on different transport modes;
- The implementation of innovative, integrated services, providing citizens and tourists on the move with real-time information and added-value services, could help achieving an increased intermodality between the city PT system and private vehicles. This would result in the optimisation of the utilisation of the road network in terms of both private and public transport flows;
- The use of ITS technologies would also help to manage more efficiently the distribution of goods in the LTZ, in the city centre and wherever there is a congested area.

Instant Mobility results exploitation

The plans of the Municipality regarding mobility, especially in the short term, aim at improving the offer of transport through the strengthening of collective systems and the encouragement of intermodal travel for people and goods. Thus, Instant Mobility is in line with this philosophy, and the project results offer many inputs for interesting exploitation to the local reality of the city of Rome. Rome Public Transport operator, ATAC, within WP6 had the opportunity of gathering the actual needs of urban travellers, obtaining an updated insight on what aspects focus in the near future. Speaking more broadly, the technical WPs and the three identified scenarios offer a wide range of ideas not only in the PT sector, but for the whole topic of urban mobility. Although Rome is not included in the pilot Phase II of the FI-PPP, the Programme is

certainly an important initiative to follow also in the future, given the direct participation of ATAC in Phase I.

4.1.1.2 Istanbul

Main transport and mobility issues

- Road congestion due to the topology (old city, not planned, no way to add roads) and commuters travelling to and from the city everyday (many Istanbul people live on the Asian side of the city but work on the European side or vice-versa while there are only two suspension bridges that span the Bosphorus);
- No real multimodal policy because there are several different departments for transports issues;
- No real time data on public transports schedule and traffic available.

4.1.1.3 Nice

Main transport and mobility issues

- A large part of the traffic is due to transit international fret (Nice area is a passage to Italy);
- The part of individual car in the total modes of transports is 53 %;
- Due to its proximity to the Principality of Monaco and to the Italian border, Nice is the second international airport in France (10 million passengers per year, 100 destinations), while the airport is poorly served by public transports (only 18% of the airport passengers use the public transports).

Why Instant Mobility

- Support the global transport policy:
  - 1€ ticket
  - Intelligent parking
  - Development scheme by 2030 of 2 new tramway lines
- Increase the use of public transports
- Provide better quality of service to Citizen
- Decrease traffic congestion due to a very dense territory
- Reduce the carbon footprint
  - ✓ NCA is aiming for a 30% decrease by 2020 of greenhouse gas emissions due to local transport
- Support multimodal hubs (e.g. Nice St Augustin hub: airport, TGV station, bus, tram)
- Ability to spread users amongst the transportation modes in case of saturation
- Cost savings in operation

Instant Mobility results exploitation

Nice has been one of the forerunners in the Smart City Concept implementation. The whole area is covered with a 1€ general public transport ticket, there is electric car sharing pool, environmental sensors, open data warehousing and networking. The city is thus a good platform for testing new innovative services and willing to implement project results.

The project results will allow the metropolis to go one step further towards smart mobility through innovation to benefit citizens. Such a system could in the future be integrated to the several multimodal hubs of the metropolis territory, including the main "Saint Augustin" multimodal hub that will be located by Nice Côte d'Azur international airport in 2016. In this manner, all the different transportation modes existing on the territory will have to be taken into account (walking, bus, tramway, train, bike sharing, electric car sharing, ride sharing, ferry, plane, taxis).

On top of transportation data, the system should also include infrastructure data such as parking location, touristic places, and gather data from all sensors deployed in the metropolis (environmental sensors for instance). The application should then also be able to provide users efficient information along their journey:

- In case of incident on the journey
- In case of emergency (flooding, waves, earthquake, snow, etc)
- In terms of environmental data (CO_2 emission)
- In terms of tourism and events promotion
- …

4.1.1.4 Trondheim

Main transport and mobility issues

- Trondheim is an historical city founded in 997, while the city is growing rapidly and is in need of an improved traffic scheme: indeed arterial roads from south, west and north have had queues and delays for decades;
- Trondheim has a problem with local air pollution largely connected to local traffic congestions;
- In Trondheim there is a cooperation and joint solution for new roads and transport solutions between Trondheim municipality, Sør-Trøndelag County Municipality and the Norwegian Public Roads Administration (the main plans related to transports are incorporated in Miljøpakken stage 2 that was politically confirmed by Trondheim municipality, Sør-Trøndelag County Municipality in April 2012);
- The aim of Miljøpakken is that all new traffic growth will be by green transport like walking, cycling and bus. 50 % of a 1000 million Nkr investment scheme are used to support green traffic growth. Public transport has been reorganized and buses are now solely based on environmentally friendly schemes using LNG gas or hybrid solutions.

Why Instant Mobility

The aim for green traffic growth needs more support than just reduced bus fare costs and traffic restrictions for private traffic. A real time information system implemented on all buses gave a boost, and the city is looking for new technology solutions to support its schemes.

More specifically:

- Support multimodal real time traffic information to promote green transport in Trondheim
- Attract and recruit new bus travellers that are now travelling by car (drivers)
- Support local freight transport by flexible solutions reducing waiting time, pollution and secondary effects like queuing due to goods delivery
- Improve traffic management in the city to reduce queuing and pollution as well as promote green transport solutions

Instant Mobility results exploitation

Trondheim has been most active in Scenario 3 – Transport infrastructure as a service, and we are progressing with the achieved results regardless of the absence of such transport use cases in FI-PPP Phase 2. Trondheim has also participated in some Scenario 1 – Personal travel companion tasks.

A local questioner giving more than 1300 replies raised the focus on multimodal information systems, and Trondheim will progress with this topic outside the Instant Mobility project.

4.1.1.5 Toledo

Main transport and mobility issues

In Toledo, guidance for tourists is a vital issue. The geography of the city is cumbersome for traffic planning, particularly as new suburbs have formed during recent years.

Instant Mobility results exploitation

The service platform to be developed by the Instant Mobility was said to be interesting for implementation, but there is no decisions yet made. Special interest is also apparent for the general dynamic planning for remote control over of mechanical street closure cylinders and payment solutions. Overall co-ordination of individual traffic companies is of interest as the number of independent companies in Toledo is high.

4.1.2 Programme collaboration

Due to the specific architecture and structure of the FI-PPP Programme, the expected impact will only be reached through effective, dynamic and fruitful cooperation between all projects, and in particular the Core Platform/Technology Foundation project (FI-WARE), the Capacity Building and Infrastructure Support action (INFINITY) and the Programme Facilitation and Support action (CONCORD).

One of the specific activities of the project (WP2) aimed at organizing the exchanges between the Instant Mobility project and the other projects of the FI-PPP programme, and more specifically at (1) organising the collection of Core Platform (FI-WARE) requirements regarding Future Internet Generic Enablers; (2) identifying common issues and challenges with the other Usages Area projects; and (3) identifying with INFINITY project target infrastructures to prepare pilots in Phase II.

The detailed functional and technical description of Instant Mobility requirements with respect to the Core Platform have been provided to FI-WARE. Reciprocally, Instant Mobility partners have identified which FI-WARE Generic Enablers could be useful and used by Instant Mobility scenarios and which high-level functionalities were expected from each GE.

4.1.2.1 FI-WARE

As a member of the FI PPP programme, Instant Mobility aims to contribute to Future Internet building applications and services using a common Core Platform which is being defined by the FI Architecture Board.

The project provided an initial functional and technical description of its requirements towards that Core Platform to be provided by FI-WARE project, based the first description of Instant Mobility scenarios (deliverable D3.1). These were validated with FI-WARE, while the impact for Instant Mobility architecture was determined, based on exchanges with the other Usages Area projects and the FI-WARE project feedback. After which these requirements were translated into more detailed specifications following guidance from FI-WARE (Instant Mobility deliverable D2.3).

During the second year of the project, Instant Mobility was able to collaborate with FI-WARE through the educational sessions, webinars, dedicated conference calls and e-mails. To strengthen the collaboration, Instant Mobility was using the regular Architecture Board meetings to interact and exchange with FI-WARE about technical requirements. The many partners involved in both projects, such as TID, Thales or Telecom Italia, also facilitated the dissemination of FI-WARE inside Instant Mobility.

As a result of such technical discussions, Instant Mobility has forwarded a series of functional and non-functional requirements to the Core Platform that have been registered in the “FI-WARE Theme/Epic/Feature Requests Tracker” as new epics to be included in the FI-WARE backlog.

The contribution of Instant Mobility with regards to FI-WARE DDS must be highlighted: indeed in Instant Mobility, we opted for **data distribution** (OMG DDS) to perform big data analysis (more flexible, since it does not require processing to be independent. It should be noted that we had identified the "Data Distribution GE" as a key enabler for Instant Mobility, but for Scenario 1 prototype final demonstration in Barcelona, we integrated DDS (OpenSplice Implementation) in order to achieve our scalability requirement (up to 10 million users). We have demonstrated that using DDS, our system is infinitely scalable; doubling the number of users requires only doubling the number of servers (in Barcelona, four multi-modal itinerary calculation engines were used).

Integrated GEs in Travel Companion prototype include:

- Data Handling GE – To retrieve and display the pictures of the travellers/drivers according to the diffusion policy specified by the users.
- Identity Management – For users’ login authentication (access token required to access Instant Mobility services).
- Object Storage GE – To store travellers itineraries for statistical analysis purpose.
- CDI GE:
    - CDI personal data
    - CDI user profile

- CDI device sensor

- Location

For the “Smart City Logistics”scenario, the following FI-WARE enablers were considered to be of special interest:

- Identity Management: Authentication and authorization of web applications and RESTful web services (The Identity Management only supports SAML for API based authentication/authorization. SAML doesn’t however work with RESTful web services, since it is dependent on a SOAP header for transferring the SAML messages)
- Location Platform: For retrieval of location of mobile terminals
- Internet-of-Things Gateway Data Handling: For collection of eco-drive data from the vehicles
- Big Data Analysis: Provides storage

  The FI-WARE Big Data enabler today consists of a map/reduce platform, which is a specialised tool for tasks such as extracting information from large data streams, such as log files generated by telecom systems. If the Big Data generic enablers are further developed to also include tools for supporting other big data challenges, such as, for example, document oriented storage, it will be relevant for a larger set of use cases, including the ones within smart city logistics.

For the “Transport infrastructure as a service” scenario, the following FI-WARE enablers were considered to be of special interest:

- BigData Analysis GE. This enabler is used to process huge amounts of data, which have been previously stored or can be continuous unbounded and large streams of data that extract relevant insights on the go;
- Complex Event Processing GE. Is the analysis of event data in real-time to generate immediate insight and enable instant response to changing conditions. The technology and implementations of CEP provide means to expressively and flexibly define and maintain the event processing logic of the application.
- Publish / Subscribe GE. It enables the publication of events by entities, referred as Event Producers, so that published events become available to other entities, referred as Event Consumers, which are interested in processing the published events.
- Location GE. Targets any application, GEs in FI-WARE or any complementary platform enabler that aims to retrieve mobile device positions and Location area events. This GE is based on various positioning techniques such as A-GPS, WiFi and Cell-id whilst taking into account the end-user privacy.
- IaaS Service Manager. This GE is key component to provide an automated control solution over Virtual Machines through scaling up/down and in/out in an automated manner and helps to save valuable time/resources by automating management of failure tasks that need to be done repeatedly.

The contribution of Instant Mobility to GEs specification can be summarized as follow:

- 6 requirements were already covered by FI-WARE, meaning that IM corroborated the usefulness and validity of related FI-WARE features.

- 8 requirements were discarded by FI-WARE, mainly because they were considered too specific and/or too close to specific application.
- 8 requirements are open or under evaluation by FI-WARE, mainly because they are being taken into account for future releases.
- 3 requirements have been included in FI-WARE backlog upon Instant Mobility request: The support of proximity interfaces (NFC) in Connected Devices Interfaces GE; the provision of an API for accessing proximity information; and the implementation of OpenID Connect standard to be included in future releases.

The following recommendations for existing FI-WARE components were formulated by the project:

- Instant Mobility travellers would definitely prefer to access different mobility services using a single authentication ID to avoid remembering and managing many different user IDs and would prefer to authenticate just once for those many services.
- A further user experience simplification would be possible when travellers interact with services by means of applications running on mobile terminals; in this case the user could be automatically identified and authenticated through the SIM ID. However FI-WARE Generic Privacy Enabler does not support it now. Identification via SIM ID requests a dedicated enabler provided by the mobile network. FI-WARE is investigating the possibility to implement such enabler.
- We recommend that Single SignOn feature will be supported by FI-WARE through cooperation of Security:Identity Management:IDM and I2ND:CDI::User profile

4.1.2.2 INFINITY

The main objective of the INFINITY project is to gather and communicate information about smart cities and available experimental infrastructures in Europe and beyond, in order to facilitate large scale experimentation and testing for Future Internet projects. The main issue is to find out which smart cities are ready to “open up” their infrastructures for experiments by FI-PPP projects.

Feedback from FI-PPP projects is welcome in order to have a common understanding and possibly lead to a common definition of a “smart city” and to gather their needs for Phase II. Moreover dissemination could prove essential to promote the need for Future Internet experimentations and large scale trials among smart cities representatives, mostly from local authorities.

INFINITY has been invited to participate in Instant Mobility stakeholder workshops, which essential to better understand the requirements from the projects and the interactions with their external stakeholders. Moreover the sharing of information was also facilitated by the presence of common partners in both projects, TID and Thales.

Thus the collaboration with INFINITY has been ensured through continuous feedback and link to Instant Mobility cities, but also regular attendance to Use Case meetings and INFINITY Concertation Board meetings.

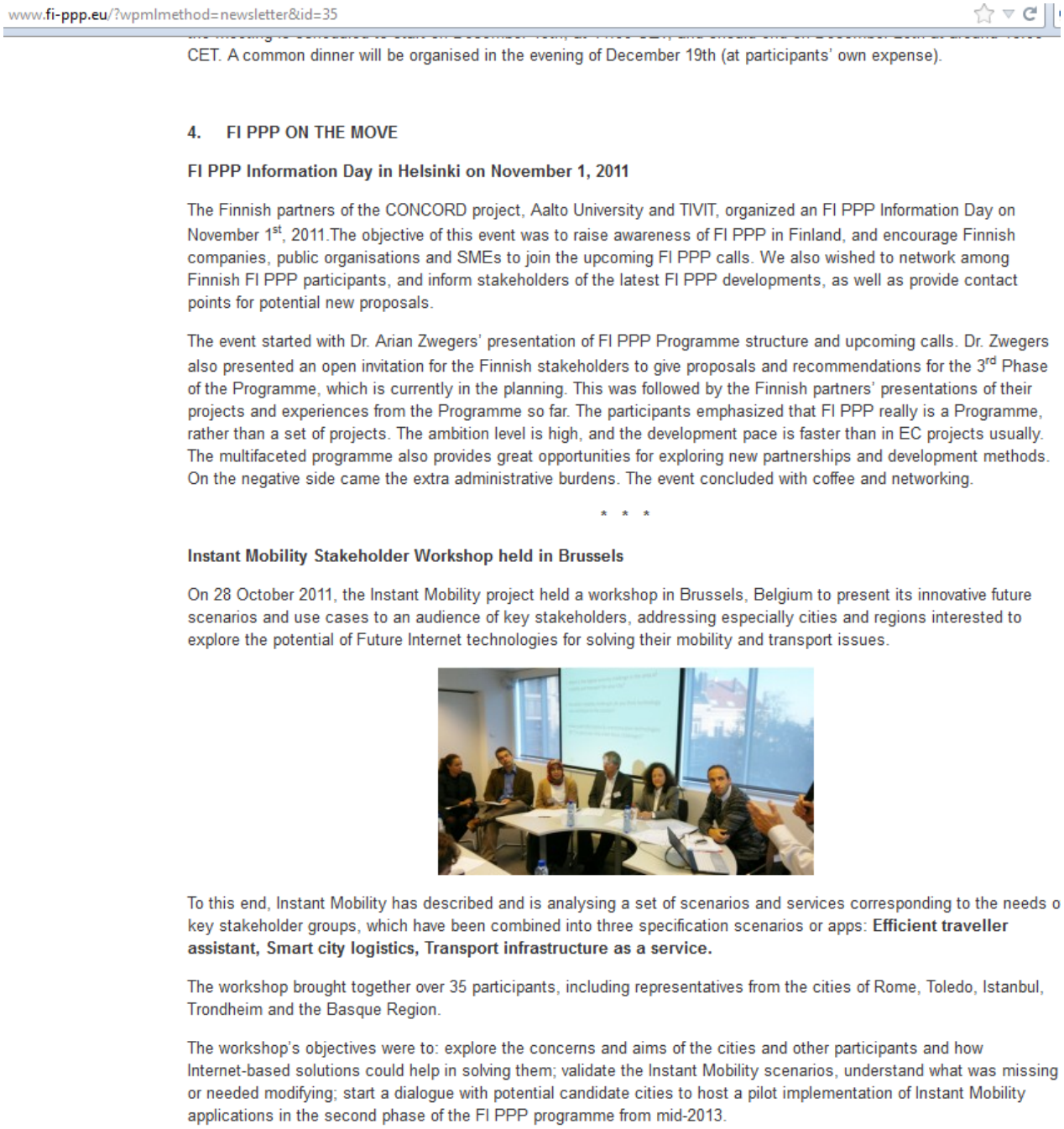
4.1.2.3 CONCORD

CONCORD supports the European Commission and the FI PPP constituent projects in implementing the programme in a coherent way. The Support Action coordinates and facilitates

cross-project collaboration, knowledge transfer and co-creation across projects as well as with related external groups.

To that end, CONCORD issued a dissemination strategy, which Instant Mobility, together with the other UA projects, has contributed to. CONCORD has also established the Dissemination Working Group, which regularly met. Instant Mobility was attending these meetings and contributed actively:

- to the Snack newsletter and the CONCORD web news to disseminate our activities, namely the stakeholder workshops we have been organising;


www.fi-ppp.eu/?wpmlmethod=newsletter&id=35

CET. A common dinner will be organised in the evening of December 19th (at participants' own expense).

4. FI PPP ON THE MOVE

FI PPP Information Day in Helsinki on November 1, 2011

The Finnish partners of the CONCORD project, Aalto University and TIVIT, organized an FI PPP Information Day on November 1st, 2011.The objective of this event was to raise awareness of FI PPP in Finland, and encourage Finnish companies, public organisations and SMEs to join the upcoming FI PPP calls. We also wished to network among Finnish FI PPP participants, and inform stakeholders of the latest FI PPP developments, as well as provide contact points for potential new proposals.

The event started with Dr. Arian Zwegers' presentation of FI PPP Programme structure and upcoming calls. Dr. Zwegers also presented an open invitation for the Finnish stakeholders to give proposals and recommendations for the 3rd Phase of the Programme, which is currently in the planning. This was followed by the Finnish partners' presentations of their projects and experiences from the Programme so far. The participants emphasized that FI PPP really is a Programme, rather than a set of projects. The ambition level is high, and the development pace is faster than in EC projects usually. The multifaceted programme also provides great opportunities for exploring new partnerships and development methods. On the negative side came the extra administrative burdens. The event concluded with coffee and networking.

* * *

Instant Mobility Stakeholder Workshop held in Brussels

On 28 October 2011, the Instant Mobility project held a workshop in Brussels, Belgium to present its innovative future scenarios and use cases to an audience of key stakeholders, addressing especially cities and regions interested to explore the potential of Future Internet technologies for solving their mobility and transport issues.

To this end, Instant Mobility has described and is analysing a set of scenarios and services corresponding to the needs o key stakeholder groups, which have been combined into three specification scenarios or apps: **Efficient traveller assistant, Smart city logistics, Transport infrastructure as a service.**

The workshop brought together over 35 participants, including representatives from the cities of Rome, Toledo, Istanbul, Trondheim and the Basque Region.

The workshop's objectives were to: explore the concerns and aims of the cities and other participants and how Internet-based solutions could help in solving them; validate the Instant Mobility scenarios, understand what was missing or needed modifying; start a dialogue with potential candidate cities to host a pilot implementation of Instant Mobility applications in the second phase of the FI PPP programme from mid-2013.

Figure 15: Screenshot Snack newsletter November 2011

- in any proposed activity (e.g. 9 May 2012 session right before FIA in Aalborg);
- to the Wiki (e.g. preparation and organisation of the FI PPP large scale event in conjunction with the Mobile World Congress in Barcelona in February 2013);

- to find synergies with other UA projects, e.g. for video production.

CONCORD also organised a Use Case meeting with all UA projects on 25 January 2012 in Brussels, which produced a very early draft of potential commonalities between the programme projects.

Instant Mobility also actively participated in the Exploitation and Business Modeling Working Group, where it shared with the other UA Projects the IM framework to analyze the potential value chain, as well as the proposed canvas for Business Model Generation.

4.1.2.4 Other UA projects

In deliverable D2.4, Instant Mobility has identified common functionalities, technical solutions and business interests with other Usage Area projects of the FI PPP Programme. The results achieved until now have been obtained through (1) peer-to-peer meetings (more details further down) with **Finest**, **SmartAgriFood** and **SafeCity** projects, (2) presentations made in the plenary use case meetings organized by CONCORD, (3) analysis of web pages of all projects.

Typically, four projects are dealing with some transport and logistics issues. Logistics is the core business of Finest, and one of the main topics of Instant Mobility and SmartAgriFood. While one of the five clusters of **OUTSMART** deals with sustainable urban transport for people. SafeCity deals with safety (including road safety) and (public internet) security aspects.

How could Finest scenarios complete or improve Instant Mobility "Smart City Logistics Operations"? How could Instant Mobility enrich smart agro-logistics scenario (SmartAgriFood)? How could Instant Mobility platform incentive public transport in OUTSMART cluster? These are some of the questions that led to the identification of the following technical and business potential commonalities:

Figure 16: Potential technical commonalities between IM and other UA projects

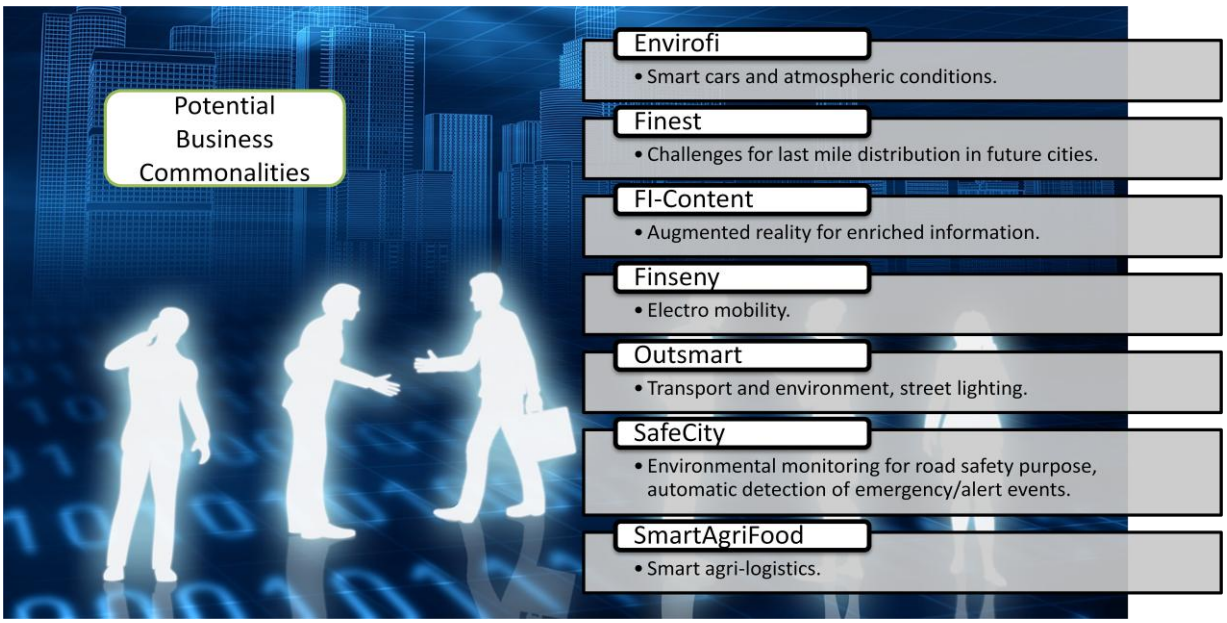


Figure 17: Potential business commonalities between IM and other UA projects

Finest Use Case 2 (Air Transport of Equipment) deals with a complete door-to-door transport chain, by dividing it in three main parts: 1 - Shipper to carrier, 2 - Carrier process (Forwarder to Carrier, then Carrier to Forwarder) and 3 - Carrier to consignee. Because Consignee is an actor of Instant Mobility Smart City Logistics, commonalities exist at least to push right information to consignee.

Sharing up-to date information about goods as well as available resources for shipment are common concerns between Finest Air Transport of Equipment scenario and Instant Mobility Smart City Logistics and specific enablers should be shared between the two projects and adapted for each environment.

The issue of electronic document exchange has been raised many times in Finest scenarios when Instant Mobility Smart City Logistics did not target this issue. This could be an interesting input from Finest to improve Instant Mobility Smart City Logistics apps.

Three **Outsmart** clusters could have business commonalities with Instant Mobility: Transport and Environment, Waste Management and Street Lightning:

- Outsmart Travelsmarter is an incentive-driven, cross-sector approach to multimodal transport management and real-time information provision to encourage sustainable transport mode choices.
- In order to further increase efficiency and improve the city cleanness, “intelligent” waste containers, i.e. which send a signal when they are full or defective, can optimise waste collection management and the maintenance of containers. This information would also be useful to optimize truck fleets itinerary.
- The use of the mobile phone as a sensor is a typical commonality between Instant Mobility and Outsmart. Adaptive street lighting system that can automatically adapt illumination levels to detected pedestrians’ and cars flows may entail an important energy saving.

In addition to the automatic sensors, the drivers’ and travellers’ network may bring to the **SafeCity** scenarios interesting crowdsourced data (get or confirm early alerts and awareness) to the dispatch and emergency centres. The smart alert mechanism may take into account the profile, location and itinerary of travellers and drivers, including of professional drivers and change itinerary and drop point time/place. This mechanism will bring another source of data to support

the best solution for a multimodal travel depending on where the incident happens in the city. Moreover the cooperative intersection and traffic signal control system of Instant Mobility may be connected to the safety and emergency system.

The whole logistics process from ordering, stock control to the preparation and delivery of the goods will be integrated in the future. To be more efficient, dynamic information on re ordering, supplier vehicles' availability and location, events on the road like jams or vehicle breakdown should be shared between **SmartAgriFood** and Instant Mobility for better forecast and prediction (production and ordering plan). Moreover SmartAgriFood flexible parking system for delivery to shops application may be linked and interact with the Dynamic time/place drop point of Instant Mobility. The real time identification of the parking places or drop points or any places for delivery or exchanges of parcels, and their availability is a keystone in the delivery process, to optimize the time.

Beside the projects mentioned above, commonalities have also been identified with the following UA projects:

- **EnviroFI**: targeting the environmental Usage Area perspective, the project would use Future Internet capabilities to support dynamic understanding of terrestrial, atmospheric and marine spheres. Regarding atmospheric conditions and pollution information, the project considers data from several sources including smart buildings and smart cars. With their own mobiles, users could be "mobile sensors" with enriched contextual information. Moreover the air pollution indicators could be added to the Personal Travel Companion in order to select, according to the user's profile and location, an alternative journey or the best itinerary that suits his/her preferences (level of pollution) or constraints (level of pollen he is allergic to).. Global traffic information, virtualized intersection intelligence and global area optimization strategy could also be adjusted and drivers' flow diverted from the most polluted places
- **FI-Content**: media and content is a key usage driver for the Future Internet as today's internet traffic includes more than 50% of audio/video material. The project focus is to investigate how the production, sharing and interactive use of content for professional broadcasting, entertainment and educational users, can benefit from Future Internet. One of the challenges investigated by the project that is of interest to Instant Mobility is augmented reality, which may enhance the guidance and accessibility of itineraries proposal of the Personal Travel Companion. Moreover the User Generated Content of FI-Content, which is a mean to share interaction on digital data, to create or develop a common group with other people (family, friends or larger communities), may be very interesting for the Dynamic Ride Sharing application. The social web is a source of information and decision support for the commuters, which brings feedback, trust and commitment to new ways of travelling such as ride sharing. Instant Mobility will bring in its turn a lot of dynamic data on the road conditions, weather, traffic, transport availability, etc), which may interest the user of FI-Content communities (e.g. when creating and sharing an event as a concert). What is more, 3D maps may be very useful for professional drivers who have other requirements on maps and guidance systems (e.g. indications on road conditions, largeness of the road or space to operate, maximum length and height of vehicle). Eco-driving may also be enriched by Edutainment, mixing the experience with a geo spatial logic and a social perspective where the community data information is presented and shared. The 3D and Augmented Reality may also be useful for the Dynamic time/place place drop point application, as the delivery or exchange point may not be public nor on maps so mixing real environment, the map and a virtual one helps to better visualize it.

- **Finseny**: the project aims to identify how Future Internet-enabled services could enhance applications to optimally use grid infrastructures and transform smart building, smart home or electric mobility; the latter being a common point of interest between the two projects. Availability of charging points for electric vehicles can be integrated in the best route calculation for travellers and professional drivers using such vehicles.

Beside these commonalities, common issues have been identified between the different UA projects, such as the exchange and storage of huge volumes data from a variety of sources, or parking utilities. Moreover Envirofi, SafeCity and Instant Mobility would involve citizens as "sensors" to collect information on environmental criteria or mobility; though for the time being, it is not clear if the three projects would consider people as mobile sensors or if it is only the case for Instant Mobility. EnviroFi, SmartAgriFood and Instant Mobility all include user profiles as a major input to contribute or use a service, which involves additional security requirements to enhance privacy and data integrity.

Further collaboration at programme level,

The FI-PPP Exploitation and Exploitation and Business Modelling (EBM) Working Group provided also some inputs especially for a better understanding how some of the Use Cases projects expect to implement some new Business Models but this EBM working Group really met in September and December 2012, and then in March 2013.

4.1.3 Deployment enablers investigation[17]

4.1.3.1 User acceptance

Multimodal services require strong commitment from European users to adopt new sustainable ways to use all transportation means. Instant Mobility has investigated at the European level acceptability criteria for people and companies to invest and modify their vision of future transport.

The first of two acceptability surveys scheduled under Task 6.1, one targeted at citizen travellers and the second one for professional drivers, was organised online during March 2012 in three partner cities of the project: Rome, Istanbul and Nice. In a second phase, and in parallel with the professional drivers' survey, a new survey for citizen travellers were conducted in Trondheim.

Citizen travellers survey

6517 answers were received. The purpose of this work was to provide recommendations to other WPs, i.e. for the technical specifications carried out in WP4 "Future internet Enablers" and WP5 for Phase II implementation plan for the real life experimentation of Instant Mobility services. Moreover acceptability issues are also a key point for task 6.2 "Data business cases" to find out incentives for the new applications. They are also interwoven with privacy and security issues investigated in Task 6.3.

The focus of the first survey were the most critical criteria for the conditions of use of the technical solutions provided by the projet: (1) being localized in real time, anytime and anywhere during a travel; (2) personal data usage implied by customized services according to the traveller's specific

[17] The EU-funded FI3P project's has been commissioned to carry out a study to identify the potential economic and societal longer-term impacts of the public-private partnership, as well as any economic, legal and societal barriers to the competitiveness of European Internet industry (http://www.fi3p.eu).

needs and expectancies; and (3) the ranking of these services. Legal issues, corporatism and payment were out of the scope of this study.

Most of the envisioned multimodal scenarios require anytime-anywhere geo-location to deliver the best multimodal solution to travellers and individual or professional drivers. As people are nowadays using location applications with smartphones, the acceptability of this on-demand tracking mechanism is one of major criteria.

Travellers' and drivers' profiles, as well as the current context of each individual situation whether on-trip or on-board including travelling time and/or cost constraints are key to propose and deliver multimodal solutions. To optimize real-time solutions, most of these data could be stored and analyzed to allow predictive and on-trip mechanisms. Management of privacy and related security tools for encryption and rights policy is another critical criterion for acceptability (see chapter 4.1.3.2).

To take advantages of all Instant Mobility services, citizen travellers and professional drivers would be part of a new kind of social network – urban area mobility network – where everyone could evaluate solutions and people for everyday sustainable transport optimization.

The aim of the first survey was to evaluate under which conditions citizen would accept to benefit from the Instant Mobility services in this context. Participating citizens were thus first asked about their current behaviour: how they find information to prepare their travel and manage their journey; if they ever register personal preferences and what are their actual practices and uses of their mobile and navigation system in that context. We also chose to question them about their habits in giving their opinion on a service they used.

The proposed options corresponded to different levels of privacy conditions to test how far they consider the "selective disclosure" and how they would like to manage it (e.g. medium commitment with only limited information until low commitment with completely anonymous information). We also asked participants to express themselves about the conditions under which they would accept their previous travels and preferred means of transport to be recorded, and questioned them on the usefulness of the location and personal preferences in services provided. We extended the question on the usefulness and willingness to rank the services.

A majority of respondents (between 60% and 65%) would be willing to accept the transmission of their location under certain conditions, privacy and traceability particularly,and the conditions which limit the time and the possibility of recording the travel.

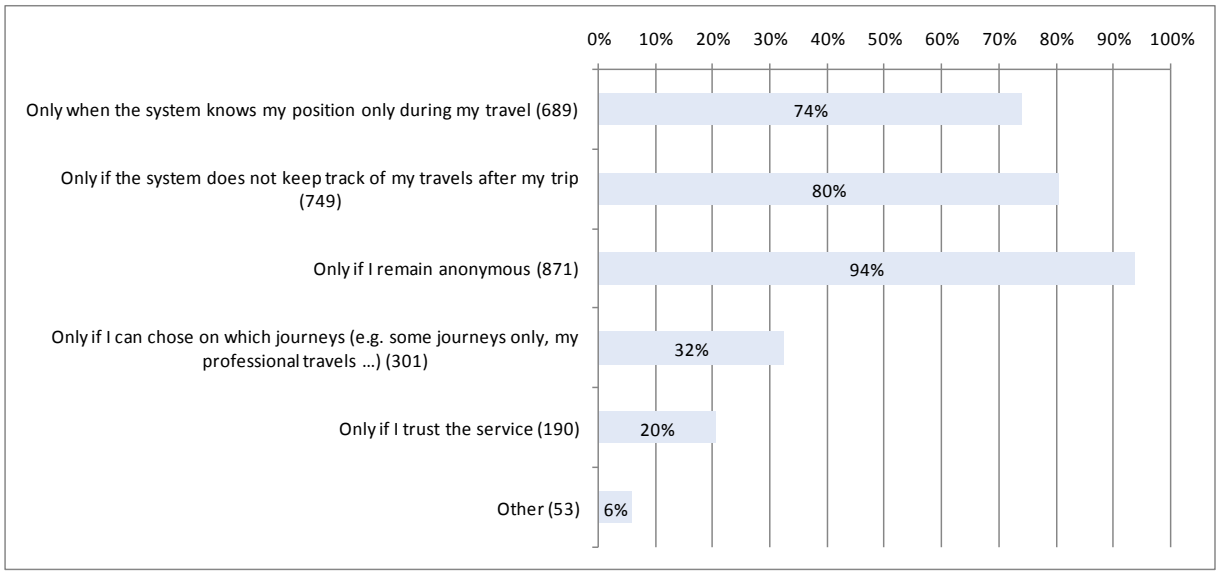


Figure 18: ATAC survey results on question “To which extent are you willing to accept transmission of your data?”

The trust in the service only arrives in third or fourth position. However the capability to adjust the system functions to individual preferences seems to improve the level of trust, giving users a sense of control, which woul play an important role in the uptake of the technology[18]. This factor should thus not be undermined.

Perceived usefulness has also a significant influence on citizen travellers' intention to accept the transmission of their location. In Istanbul, it is mainly the perceived usefulness of Instant Mobility’s services to:

- make their travels more quickly and in better conditions
- estimate the duration of their trip
- indicate their favorite destination
- inform on the waiting time for connections

For Roma citizen travellers, it is rather:

- - the possibility to be guided to a destination all along their trip
- - the possibility to make their travels more quickly and in better conditions
- - the information about the environmental impact

In Trondheim, only the estimation of their trip's duration has a significant influence on citizen travellers’ acceptability of location transmission.

In conclusion, providing privacy and traceability criteria may be sufficient but in order to optimize the adoption and use of Instant Mobility services it will be better to add the possibility to use the service anonymously. However, anonymity criteria alone will not stimulate the adoption of Instant Mobility’s services.

Moreover the study has confirm the need, for the daily travels, to get information frequently or regularly (between 60 to 94%), and that the mobile phone is already the main source to get it today (50 to 90%). However it seems that people don't often give feedback on the service they have just used and they are not used to register their preferences.

Finally, very few in the four cities declare being a ride sharing traveller or ride sharing driver (0.3%). If Instant mobility aims to encourage ride-sharing in urban services, the services have to consider giving information about the driver experience and his reputation on Instant Mobility services. It is also very important to avoid giving information about gender of the driver or traveler. These criteria have a strongly negative impact on intentional acceptability.

Some exchanges with persons involved in this domain opened the door to using the prescriptive role of social media and participatory and conversational communications to develop new services and manage the communities involved in the project.

Indeed social networks could:

- **Develop notoriety/popularity, arouse interest and generate a desire to belong** to the social web as a source of information and decision support for consum'actors; change behaviours; “word of mouth” effect;

[18] Studies by the European research project SWAMI (www.isi.fraunhofer.de/t/projekte/e-fri-swami.htm)

- **Generate participation**: create interacting communities of citizens, policy makers, service providers sharing the same interests (service, ride sharing, same workplace, same neighbourhood, hobbies, etc) to develop a new, ecological, collaborative way of travelling;
- **Collect data supplied by users to create collective value**: detection of new needs and emerging services, creation of new services by big data analytics, etc;
- **Act as automatic sensors for traffic management** (via smartphones, cars, Twitter) combined with human sensors (e.g. Waze) to develop reality mining, combining "big data" sources to influence local authorities to encourage new uses;
- **Match supply and demand**, for example for ride sharing, by using channels that are already engrained in internet users' habits (social networks represent 22% of the time spent on the internet worldwide); achieve sufficient scale for the network to be functional (e.g. Zimride, Lyft in California, Avego).

Professional driver survey

A number of Instant Mobility services target the professional driver. These professional drivers are active in freight transport and parcel delivery. Examples of these Instant Mobility services are:

- Plan your route
- Guide you along your route
- Reschedule your route using traffic information
- Reschedule your route using new incoming delivery/pick up orders
- Organise parcel/load sharing between colleagues and perhaps other companies to improve sector efficiency
- Provide eco-driving support to help you to drive efficiently to limit the fuel consumption

These services all require sharing of location data. The purpose of the survey was thus to investigate the acceptability of these new services as well as their willingness to share location data.

Dutch, Spanish, French and English versions of the survey have been designed. An analysis has been done on the Dutch (N=168) and French responses (N=27). The amount of responses on the Spanish (N=13) was too small to do any quantitative analysis. There were no responses at all on the English version. As the French survey was answered by a relatively small group, we should be reticent in generalizing the results; hence the figures presented hereunder are only based on the Dutch survey. The specific French survey figures can be found in the deliverable D6.4.

45% of respondents indicated using a fleet management system. The respondents who use a fleet management system also indicated which functionality of the system they use, i.e.:

- *Planning:* 72% of the respondents use the planning functionality usually or always;
- *Messages between driver and office:* The majority of the drivers who use a fleet management system (74%) use the messaging functionality usually or always;
- *Order handling:* The order handling functionality is used by 66% of the respondents usually or always;
- *Traffic information:* A large group never uses the traffic information (45%); almost a quarter (24%) uses the traffic information usually or always (a possible explanation is that drivers use the traffic information that is provided to them on the radio);
- *Navigation:* From the respondents who use a fleet management system half of the respondents (50%) use the functionality usually or always;
- *Eco feedback:* The eco feedback is never used by 39% of the respondents; a third (33%) uses the eco feedback usually or always.

Moreover a very large group (92%) uses a navigation system.

The figure below shows how useful the respondents find some services: the services 'plan your route' and 'reschedule your route using traffic information' get the highest scores (3,9 on a 6-point scale). Provide eco-driving support gets the lowest score (3,5 on a 6-point scale).

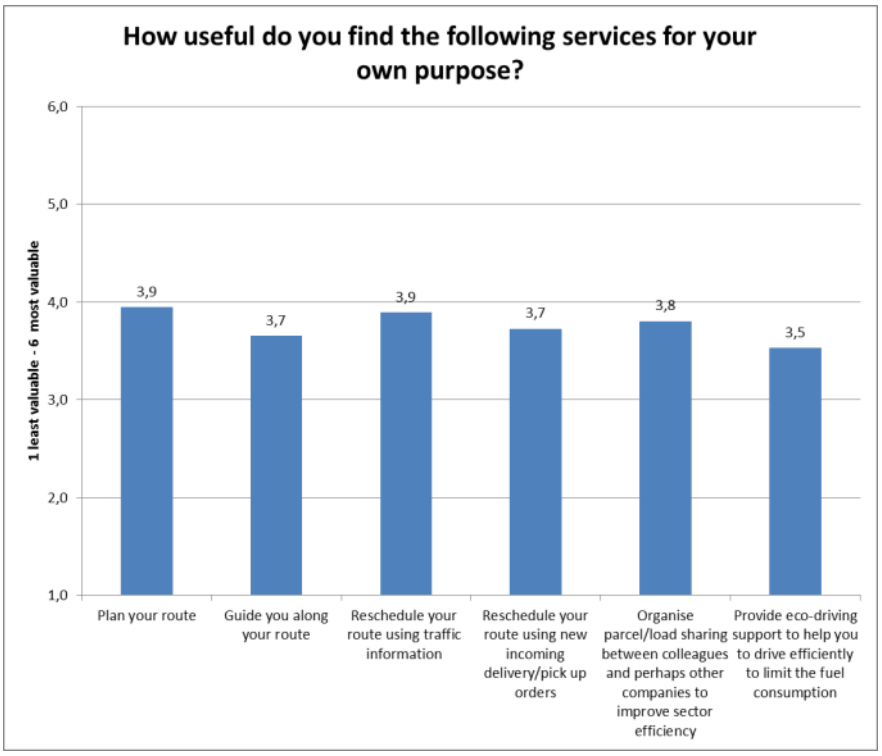


Figure 19: Professional driver survey - usefulness of Instant Mobility services

In a service that advises about the most efficient route, the respondents find it important to be able to 'overrule the advised route and pick an alternative'; 'being able to see why a specific route has been advised and what the alternative routes are' and 'being able to turn off the system are' also considered important acceptability criteria for Instant Mobility services.

The respondents find it important to be notified on changes to the itinerary and to know why the itinerary has changed. These results show how important it is to provide explanations to the users. This should be integrated in the requirements of the Instant Mobility platform.

Of the Dutch respondents almost a quarter (24%) might be prepared or is prepared (44%) to share location data for personal navigation (44%). 71% is prepared to share data to plan routes more efficiently. Of the respondents 21% is prepared to share location data to share loads with other companies. Almost half of the respondents (49%) is not prepared to share the data for this purpose. Approximately a third (34%) of the respondents is prepared to share location data to get advised about eco optimized driving; the percentage is higher (71%) for French respondents.

4.1.3.2 Security & privacy

"Social acceptance of IoT will be strongly intertwined with respect for privacy and the protection of personal data, two fundamental rights of the EU. On one hand, the protection of privacy and personal data will have an influence on how IoT is conceived. A prerequisite for trust and acceptance of these systems is that appropriate data protection measures are put in place against possible misuse and other personal data related risks. On the other hand, it is likely that the uptake

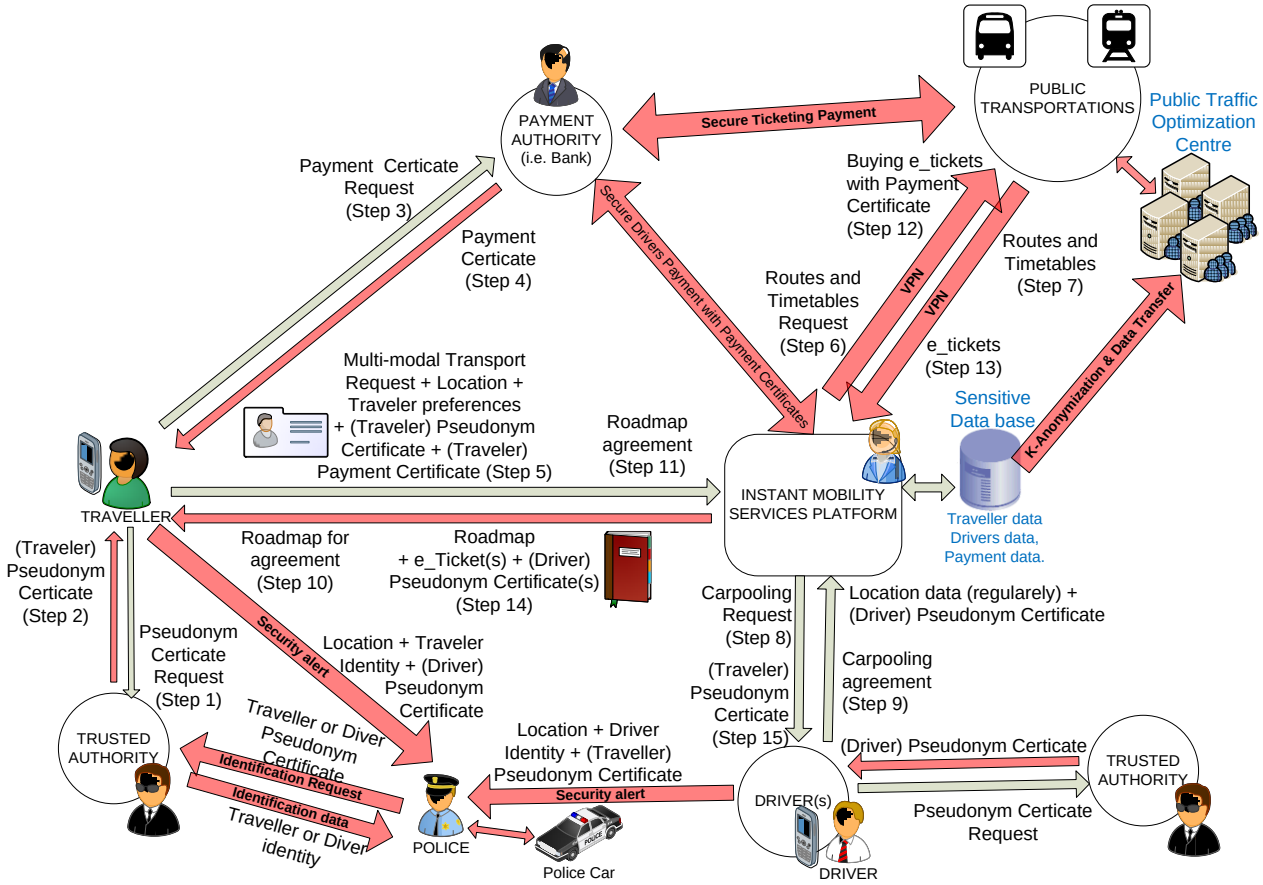
of IoT will affect the way we understand privacy. Evidence for this is given by recent ICT evolutions, such as mobile phones and online social networks, particularly among younger generations."[19]

Safety is probably the first and most important barrier that has to be overcome so that services like ride sharing, which implies the sharing of private means of transportation with a stranger, are massively used. Security is the second barrier and information security is closely linked to the questions of trust and privacy mentioned above. Indeed travellers and drivers are requesting that their personal information is protected against misuse. Majors requirements concern the IDs and personal data protection, anonymization of sensitive data (e.g. geo-localization).

The collection and storage of personal data for context-adapted and personalised travel, as well as the real-time knowledge of individual travellers location during journeys raise strong concerns among citizens and pose serious privacy threats, even though these techniques are already silently in use in various ways and do not in itself correspond to specific Future Internet threats. Furthermore many services require the sharing of personal data with different levels of privacy & security requirements: personal ID, context-based information, personal credential to access services, ticketing and payments data.

Instant Mobility is providing recommendations for security enhancements to seriously address these concerns and take the necessary measures to guarantee people and data privacy. Cryptography and anonymisation mechanisms will be systematically used for location reporting from mobile devices, strictly preventing direct association between an identity and habits or locations.

The figure below shows a solution to meet both the needs of information security, safety and privacy.



[19] Communication Internet of Things — An action plan for Europe, COM(2009) 278 final, 18.6.2009

Figure 20: Security data flow

Identity management of the user is a key point and usage of mobile phones can take great advantages in using SIM card-based authentication. Indeed nowadays, mobile terminals already have in their SIM cards "Secure Element" piece of hardware (intimately connected to the NFC radio front-end hardware) capable of storing data and computing, which content can be accessed only by an authorized entity that owns the necessary software keys. Some manufacturers recently started to sell mobile terminals with NFC radio directly connected to the SIM cards. Among the advantages brought by this technology, one of the most important (for payment) is that it works only at very short distances thus ensuring the willingness of the owner to use it and also the impossibility of interfering or eavesdropping the radio link.

Travellers will request a Pseudonym certificate from a Trusted Authority, which will be used as trusted identity from the multimodal transport request until arrival at destination. To reduce the risk of identity theft, every new request will be preceded by the delivery of a new Pseudonym Certificate. At the same time, the traveller requests a Payment Certificate to a Payment Authority, which will be used to pay the services delivered, e.g. e-tickets or carpooling. This solution guarantees to suppliers to be paid without disclosing their identity.

Travellers and Drivers can authenticate one another by a secure smartphone application that compares their respective Pseudonym Certificate. Moreover if at any time one traveller or driver feels threatened, he/she can send an alert to police with automatical transmission of both driver's and traveller's identities and position, by means of a warning button on their smartphone.

For authentication and authorization, in order to provide secure identification, in which the users' digital identities are consolidated to allow for single sign-on, an upcoming standard, OpenID Connect[20], is about to be finalized. The FI-WARE Identity Management system will provide secure and private authentication, authorization and trust management, user profile management and single sign-on. The current release does however only support SAML for API-based authentication/authorization. SAML does however only work with SOAP-based web services, since it uses the SOAP header to transfer the SAML messages and there is no standard way to transfer those messages in a RESTful web service (while Instant Mobility components and systems rely heavily on RESTful web services). Support for OpenID Connect has been proposed to the FI-WARE Identity Management GE team, who has also shown interest in supporting it in time for Phase 2 projects.

In addition, FI-WARE Privacy GE is an extension of the Identity Management GE, which enables users to decide which information might be obtained by a certain service or application. Pseudonym certificates are supported via the privacy-preserving credentials provided by the Privacy GE.

As for real time traffic information, all data from passengers, drivers and other transporters, which must be used for statistical purposes and traffic regulation and optimization, must first be anonymised. The aim is to preserve the quality for classification while masking the data to satisfy various anonymity requirements. For that purpose, Instant Mobility uses the location monitoring component from FI-WARE that monitors the real-time location of anonymised users and may also publish anonymised information about traveller`s movements. However, to publish location data without compromising privacy, either a spatial-domain or a time-domain approach has to be used. A combination of pseudonym certificates and the location monitoring component seems to be sufficient to address the privacy requirements.

[20] http://openid.net/connect/

One of the key factors for the proliferation of mobile payments is the "trust" that consumers and merchants have in these payment means. The perception of security in mobile payment transactions is an important aspect in building this trust, other aspects include the transparency of the underlying processes.

To maintain a similar trust and transparency towards customers for mobile payments as for the existing payment initiation channels, it is fundamental to establish a secure, homogeneous ecosystem also encompassing the new stakeholders (Transportation Operators, Secure Element manufacturers, application developers, Mobile equipment manufacturers, etc), in which:

- responsibilities are assigned;
- Security issues are consistently governed by the involved stakeholders;
- payment transactions are secured, comprehensible and reliable;
- privacy is respected.

Moreover operators expect that these new technologies will reduce their own exposure to security (e.g. cash theft) and liability (e.g. illicit payments) issues.

The European Commission Communication [COM(2006) 786 final] on a European Programme for Critical Infrastructure Protection sets out the principles, processes and instruments proposed for implementing such a programme, while a corresponding Directive of 2008 implements this programme in all Member States [Council Directive 2008/114/EC]. This identifies road transport as potentially European critical infrastructure.

This topic is relevant for this project to the extent that the Instant Mobility Services Platform or deployed Future Internet enablers could be classified as critical infrastructure, in this case for the transport system in case it would be vulnerable to deliberate attack or to natural disasters. At the least all relevant information flows should be secure against attacks such as spoofing travellers' identity, severely disrupting traffic management by introducing massive fraud or false information in the traffic control system, by disrupting public transport operations or by saturating traffic information with fictitious data. To ensure compliance with the legally required Critical Infrastructure protection, Instant Mobility uses a secure workflow, using the VPN technology.

4.1.4 Business modelling

Deliverable D6.5 identifies the main business issues and main elements of the new value chain: defining actors and business roles, most promising business cases, what could be the value proposition of the applications proposed and relevant incentives.

To elaborate this report, the WP6 team has first conducted a market analysis of existing solutions (see chapter 5.1.1.4), which is divided in two parts: a first analysis on a European level and an analysis on a local level based of Roma, Nice, Trondheim and Istanbul's existing solutions. The weak points of these existing solutions have then been analyzed from the end user point of view but also from other main actors of the value chain, in order to demonstrate how Instant Mobility Business Cases propose to solve those weak points, and especially how Instant Mobility will enable new data processing and production of new added value data. Lastly they have identified relevant incentives and formulated recommendations concerning usage, thanks to the acceptability study conducted in Task 6.1.

All or most of the existing tools lack of real time event and global multimodality integration. It is difficult to transfer from one transport mean to another while 65% of European car users[21] declare they would be encouraged to combine different modes of transport if it would be possible to transfer easily from one transport mode to another. Moreover there are few solutions that use at the same time synchronizing real time data and historical data to provide predictive and personalized services. The personalization is not generalised: existing tools are based on geolocalization of the travellers and use the preferences declared by the user; but there is no self-learning tool capable to update the preferences of the traveller by a deep analysis of one's habit/behaviour.

What is more, a single ticket for the complete journey covering all modes of public transport and allowing to pay with one's mobile phone would attract an even higher % of European citizens to use public transport and ride sharing combined.

The major value proposal for public transport operators and local governments is to increase asset/capital management and utilization (and, as a result, road capacity), eliminating the need to add infrastructure capacity. Operators also expect that new technology solutions provide a direct improvement to the efficiency of their operations, ultimately resulting in cost savings and in an increase in business volume. Finally, operators expect that new service offerings introduce new opportunities for marketing, value-added services and increased brand strength.

As the mobility domain concerns Business to Business, Business to Consumer, but also Business to Government, the public authorities must also be included in the value chain. The big challenge will be to make the public and private sectors cooperate. Local governments, by opening their data (maps, public transports timetables, traffic road, etc) for example, could encourage the private sectors to share data in the new business model. They could also propose additional levers to spread the usage of the new application, like advertising, subsidies, regulation (pricing policy in favour of Instant Mobility commuters).

Other significant incentives include for example a car pool lane. Subsidies related to ride sharing must provide an added value to encourage private drivers to offer these passengers their empty seats: e.g. time saving through access to High Occupancy Vehicle (HOV) lane, cost avoidance (fuel cost shared), reward, parking space, etc. The incentives to encourage people to rideshare are important to balance the fact that the cost or time savings don't outweigh the perceived benefits of driving alone (flexibility, privacy, etc.)

Instant Mobility proposes a breakthrough by acting as an intermediate actor between all the different actors of the value chain (transport operators, route operators, parking operators, data providers, etc.). By acting as a go-between, IM relieves the burden of reciprocal interfaces between all of the actors. This hypothesis has the advantage to mainly simplify the cost and revenues structures that can't be defined at this stage.

4.1.5 Phase II implementation plan

Phase II of the FI-PPP is closer to market and thus a major exploitation aspect of the project, so we described comprehensively everything that we prepared in thet project already in relation with that (as another exploitation mechanism). In terms of exploitation, these ambitions are very synergic for many consortium partners such as NCA that aims to explore and assess transport and mobility improvements in a "living lab" in the Cote d'Azur area and DLR substanciating their expertise in both constructing and conducting lage scale trials.

[21] European Commission (March 2011) - Eurobarometer – Future of transport – analytical report

Instant Mobility developed a detailed plan for implementing real life trials and demonstrations of a full-functioning Instant Mobility system in the next phases of the FI-PPP. At least two Phase II projects are interested in Instant Mobility results: cSpace (Finest and Smartagrifood), FINESCE (Finseny).

Instant Mobility implementation plan includes infrastructure requirements for pilot instantiations in real settlements with some geographical, technical and demographic limitations, to provide quantitative proof that the system has potential to succeed on a full scale basis.

Those requirements are organized around the three development scenarios (Travel companion, Smart city logistics and Transport Infrastructure as a Service). It presents the required infrastructures around the following categories:

- Data gathering infrastructures
- Data providers
- Communication Networks
- Data Management and computing infrastructures
- Service delivery infrastructures
- Terminals and in-vehicle equipment
- Instant Mobility Domain Specific enablers
- Future Internet Generic Enablers
- Other requirements

4.1.5.1 Travel companion

- Mobile networks are equipped with a localization platform (e.g. GMLC). Mobile terminals must also have a GPS receiver and be equipped with NFC radio technology and that the SIM card is able to work as the secure token for NFC applications. NFC enriches the scenario with some significant features. Mutual user ID authentication can be done that could be useful for ride sharing as a security feature. Also electronic ticketing could be done through NFC, in particular it is possible to have electronic tickets for a plurality of transport operators
- Open data (web services) that provide traffic flows information and related events is required. Data must be provided in a standard way, like XML and TPEG. Finally, in order to support different transport infrastructures or traffic management systems, a standard interface to these systems is required. For public transport operators, this interface is defined by the SIRI standard **Erreur ! Source du renvoi introuvable.**
- The presence of Wi-Fi networks is needed in areas where mobile network is not present, for instance in underground subway stations
- The exchange of information between services and the synchronization of their parallel treatments rely on RESTful Web services and are DDS-compliant. An alternative is to use an API allowing for the easy adaptation of single virtual machine (VM) applications to multi-VM, such as Terracotta

- The data management can rely on one of the new NoSQL DBMS such as OrientDB, which allows to directly manipulate objects. It exhibits good scalability performances and access speeds up to 150.000 records per second
- The service should be delivered in two ways. There should be a web portal to plan trips, and REST interfaces to access services
- It is important that all services are available through standard TCP port numbers otherwise there may be problems in accessing them from every possible network environment

4.1.5.2 Smart city logistics

- IEEE 802.15.4 is a standard radio technology for low-power, low data rate applications designed to enable transceivers of low complexity and low cost, which makes it relevant to intelligent goods applications
- To support intelligent goods based on IP connected smart object technologies, IPv6 will be needed
- A minimum deployment could be one virtual machine for the transport exchange services and one virtual machine for the eco-drive services

4.1.5.3 Transport Infrastructure as a Service

- The scenario requires the integration of open GIS (OSM) to traffic management's platform
- For cooperative traffic signal, a special road side unit connected to the back office (through mobile network for instance) and connected to OBUs (through short range communications) is needed
- A back-office able to process all data sent from vehicles and/or roadside equipment, then calculate traffic light setting and disseminate such information is needed
- For data storing, a document oriented NoSQL database possibly complemented with a relational database such as PostgreSQL (commonalities and foreseen collaboration with Scenario 2 - to be evaluated) is necessary
- In case of choosing to gather passengers information through Bluetooth instead of mobile network localization service, dedicated hardware must be installed in public transport vehicles

4.1.5.4 Potential exploitation by Fi-Content 2 Project

Based on exchanges that took place during the preparation of Future Internet PPP Phase 2, and because the social web is a source of information and decision support for the commuters, to create interacting communities (neighbours, colleagues, hobbies, etc) that share the same interest to develop new ecological and collaborative way of travelling (ride sharing, public transport), the UGC part of Fi-Content may be very interesting for the Dynamic Ride Sharing application, as the content shared will be available in an integrated and ubiquitous way (cloud stored and synchronized between all devices).

Fi-Content 2 may help to collect data in a collaborative way as Waze does for the road. The crowdsourced data from traffic (smartphones, cars, Twitter) combined with human sensors,

advices, ranking, etc. will be a significant source of information. The crowdsourced data may be for instance:

- the best way to go from a point A to a point B;
- a ranking on transport providers;
- report accidents or traffic jams on the road in real time;
- prevent or localize a controller in public transports (as CheckMyMetro);
- share a point of interest as musicians in the metro (as Roadify in Brooklyn) or a social or cultural point of interest, that may be proposed dynamically to the travelers during the itinerary (according to the profile and options – as the cultural guide proposed for instance), mixing AR, maps and user generated content;
- from the public transport drivers who already answer directly to passengers when incidents occurs (see the cases of RATP via Twitter).

Through FI Content 2 Smart City Guide and implementation of its specific technologies, all these data may be enriched with subjectiveness and real world information (pictures, video). The "smart sharing" could use context analysis, availability of the travellers and their device in order to adapt the sharing mode between commuters, enhancing the feeling to belong to a community.

4.1.5.5 Potential exploitation by cSpace Project

cSpace project would merge partially some results of SmartAgriFood Project and Finest Project. Through lots of meetings which happened during the last two years, one specific enabler from Instant Mobility related to the Personal Travel Companion, would be highly relevant to support cSpace trial.

The most interesting specific enabler that cSpace could reuse is the Multi-Modal Mobility sub-system, which integrated innovative algorithms to plan and monitor in real-time more than a thousand simultaneous journeys.

In the Finest goods delivery scenario, the two main issues are that the truck can be too small and/or the truck can be delayed when driving to destination. Smart City Logistics has the same problem to solve in an urban area so to find a new truck and adapt the delivery planning of all trucks, the Multimodal subsystem would be very useful.

In the cSpace project, the trial should target a specific concern scheduling the pick-up of goods: to arrange local pick-up with trucker when goods are available and state time to trucker when to collect the goods. This is exactly the same approach Instant Mobility has in the Smart City Logistics, i.e. identifying in real-time drop point and managing calendar for a dedicated van driver, with less complexity because in original Finest scenario, real-time is less important and they could adopt a pre-trip approach to manage this issue.

In the SmartAgriFood project, "Load sharing and optimizing" and "Itinerary booking and real time optimized route navigation" applications could be integrated into the whole process from ordering, stock control, to the preparation and delivery. To be more efficient, the whole information, especially the dynamic ones (re ordering, supplier vehicles availability and location, events on the road like jams or vehicle breakdown) should be shared between the two Scenarios and then could benefit from a better forecast and prediction (production and ordering plan). Depending on how the Smart Agri Logistics solutions will be reused in cSpace project, they could also implement the sharing GPS Location between the supplier, the haulier and the vehicles, and

the system could be extended to the final customer as Instant Mobility proposes while adapting the itinerary and the final delivery point to the consignee location.

4.2 Contribution to standards

"*Standardization will play an important role in the uptake of IoT, by lowering entry barriers to newcomers and operational costs for users, by being a prerequisite for interoperability and economies of scale and by allowing industry to better compete at international level*."[22]

Instant Mobility targets several standardization areas in the Transport and Mobility area as well as in ICT and Future Internet technologies. The project also has a dedicated task (7.3) for standardization & regulation-related issues. Deliverables D7.6 and second iteration D7.9 present the global standardization landscape, how these standards would be used in order to make the most efficient use of past developments and help move technologies to the market, as well as plans related to Instant Mobility activities.

Regulation recommendations have been developed in the second version of the related deliverable (D7.9), based on acceptability surveys analysis, data business cases and how cities involved as partners of Instant Mobility expect to deploy some services for their citizen and results of Security and Privacy analysis. Three major regulation issues have been identified: Open Data, Business relationships between Public Authorities and a myriad of existing and new commercial partners and suppliers, privacy and data traceability.

Many of Instant Mobility partners are already involved in standardization activities and contribute to relevant interest groups that provide active support across multiple standardization bodies. They will continually study the actual standards and consider when/how to contribute Instant Mobility research into new standards/protocols. Partners who plan major standardisation initiatives are involved in technical tasks of Instant Mobility, where the technical base of existing and future standards will be evaluated.

More specifically, two main areas are targeted by Instant Mobility:

- ITS standardization through **ISO** TC204 on international level, and through **ETSI** TC ITS and **CEN** TC278 in Europe
- **3GPP** standards (as Instant Mobility is focusing on mobile devices, the relevance of 3GPP is related to interfaces and how they would support real-time data collection)

Other relevant standardization organizations include:

- **IETF**: The main interest here is to cross IETF M2M standards with the European standards. Many working groups are of relevance to Instant Mobility, e.g. SIMPLE and GEOPRIV working groups discussing context services; 6lowpan and CoRE working groups focusing on including sensor nodes on transport and service level, which could be particularly relevant for Instant Mobility scenarios.
- **W3C**: As Instant Mobility scenarios are built on top of Web technologies, W3C activities to define the standard for an open and interoperable Web are of high relevance. It seems that two working groups are relevant for Instant Mobility:
    - W3C HTML 5 is to bring the web into maturity as a full-fledged application platform with standard video, sound, images, and animations;

[22] Communication Internet of Things — An action plan for Europe, COM(2009) 278 final, 18.6.2009

- W3C Geolocation objective is to develop a standardized, secure and privacy-sensitive interface so that Web applications may gain access to the user's location information.

Based on the defined requirement process that foresees links with the Core Platform project FI-WARE and continuous synchronisation efforts in the architecture and enablers' definition process, the project submits proposals for standardised interfaces and needed domain-specific components to the relevant European and global standards development organisations, such as CEN, ETSI and ISO.

Inputs towards Future Internet standards are managed through collaborative actions under the FI Program Facilitation and Support project CONCORD while domain-specific issues are directly managed by the Instant Mobility project.

Based on the three Instant Mobility scenarios (see chapter 5.1), a first view has been provided of the components and message flows (e.g. sequences diagrams) related to the envisaged enablers' sets, each of them targeting some dedicated standardization issues:

1. **Multimodal Journey optimisation enabler set**

   Major issues are related to data collection (from different transports operators) and data provisioning in an homogeneous way to end-users (travellers or drivers). The Instant Mobility team has analyzed potential standards for exchange format. Data format for data provided by Road Transport Operators is another key issue especially regarding geographical data. European standard GDF (Geographic data file) provides rules on how to capture the data as well as how the features, attributes and relations are defined.

   In the road sector, the DATEX standard was developed for information exchange between traffic management centres, traffic information centres and service providers and constitutes the reference for applications that have been developed in the last 10 years. The second generation DATEX II specification now also pushes the door wide open for all actors in the traffic and travel information sector. DATEX II is a multi-part Standard, maintained by CEN Technical Committee 278, CEN/TC278, (Road Transport and Traffic Telematics).

   An alternative more recent protocol is named TPEG[23]. TPEG specifications offer a method for transmitting multimodal traffic and travel information, regardless of client type, location or required delivery channel.

   From end-users point of view, travellers and drivers will interact with the platform using standard communication protocols from the Open Mobile Alliance (OMA) to optimize how services are delivered on mobile devices and for any brand of mobile and their related Operating System. These mobile devices have also to provide their position to the Instant Mobility system. For this purpose, MLP (Mobile Location Protocol) protocol is used.

2. **Driver & traveller enabler set**

   The short range communication standard NFC could be used for mobile payment of a multi-modal e-ticket. Security mechanisms such as authentication for validating subpart of a multimodal journey (e.g. ride sharing) without paper tickets or even ID document, could also make use of the NFC technology to wirelessly check in the traveller in the car.

3. **Vehicle & handheld devices enabler set**

[23] http://www.tisa.org/technologies/tpeg/

This enabler set targets new communication mode inside vehicles and how to merge automotive and infotainment issues, to provide applications and always-on connectivity for travellers and drivers.

The GENIVI alliance proposes an Open Source environment to implement terminal mode where travellers and drivers could use their mobile devices as communication gateways.

Standardization of cooperative ITS (e.g. European Commission Mandate M/453 on cooperative system standardization to CEN, CENELEC and ETSI) involving vehicle-to-vehicle, vehicle-to-infrastructure and infrastructure-to-infrastructure communications for the exchange of information, is also relevant, especially regarding the expected always-on connectivity for real-time services and for Instant Mobility approach to use vehicles as sensors in the whole transport infrastructure.

4. Public transport operators' enabler set

Instant Mobility has made the choice to base the external interface on both TRANSMODEL[24] and SIRI because they are the most mature European standards. There is however still a need to define a more precise format both for TRANSMODEL representations and SIRI[25] exchanges. Indeed, TRANSMODEL is a generic and very rich model that can fit virtually any type of public transport use case, but it still needs to be optimized for the type of service that is planned. The SIRI technical specification has to be defined more precisely to be concretely applied: certain classes might prove useless, others might need to be specified and their attributes qualified (ID, type, unit, time calculation, methods and protocols taking place, etc). In future versions, we will have to choose a local agreement based on SIRI and a sub-model of TRANSMODEL that are optimized for the specific context of Instant Mobility.

5. Goods transport operators' enabler set

One of the main issues regarding dynamic time/place drop point is the need to share calendar and to synchronize activities related to different companies' constraints. Instant Mobility will therefore follow the work done in related standards, e.g. CalConnect focuses on the interoperable exchange of calendaring and scheduling information between dissimilar programs, platforms and technologies (CalConnect does not design standards by itself, but identifies needs and requirements in relation and provides a list of calendaring and scheduling standards).

EPCGlobal is the most common standard in Europe to communicate with goods and develop new ICT services for supply-chain and logistics value chain.

One of the main issue regarding the dynamic time/place drop point service is the need to share calendar and to synchronize activities related to different companies constraints. For calendar data, CalConnect[26], the Calendaring and Scheduling Consortium, is focused on the interoperable exchange of calendaring and scheduling information between dissimilar

[24] European Reference Data Model for Public Transport Information, which provides an abstract model of common public transport concepts and structures that can be used to build many different kinds of public transport information system, including for timetabling, fares, operational management, real time data, etc.

[25] XML protocol to allow distributed computers to exchange real-time information about public transport services and vehicles. It allows the exchange of structured real-time information about schedules, vehicles, and connections. The protocol is a CEN standard and is based on TRANSMODEL.

[26] The CalConnect website (http://www.calconnect.org/CD1104_Calendaring_Standards.shtml) provides a list of calendaring and scheduling standards.

programs, platforms, and technologies. It does not design standards by itself, but identify and state needs and requirements, so that right standards are developed, if required.

For the interaction between freight operators and the traffic management centre (for itineraries update), the integration and use of OCIT-C protocol (standardised interfaces between central components and systems, differently from the OCIT-O, used for outstation−e.g. traffic light−integration) could represent a promising alternative to be explored in further research projects.

6. **Traffic management enabler set**

   Geolocate data on reference cartography is one of the main issues to provide accurate information on urban areas traffic. The cartography could be based on the OpenStreetMap platform.

7. **Mobile Payment enabler set**

   Payment is a key topic in multimodal travel and will be mostly based on use of mobile phones. These enablers will provide basic means to:

   - Pricing: when different multimodal travels are proposed to users the correct price for every trip and the final price have to be provided
   - Billing: this implies all the means to monitor the traveller's trip in order to determine the trip price on-the-fly. This includes for instance check-in and check-out mechanism to implement pay-as-you-go policies
   - Virtual ticketing: electronic proofs of payment must be loaded into mobile phone and accessed on-the-fly by the transport operator infrastructure; this addresses current problems of integrated ticketing caused by the need of direct point-to-point-agreement between transport operators

   This set of enablers will be built on different components that include:

   - Mobile phones and proximity technologies such as NFC
   - Infrastructure components like on board NFC devices and Point Of Sales (POS) physical infrastructure
   - Platform-based components

The Local Dynamic Map (LDM) is a data-store within an ITS-station (e.g. a vehicle or a roadside unit), which support ITS-applications by maintaining information about objects influencing or being part of traffic. The data stored in the LDM is received from different sources, static and dynamic, such as vehicles, infrastructure units, traffic centres and on-board sensors. The LDM is currently being standardized by ETSI (see ETSI TR 102.863). Instant Mobility has developed interfaces for accessing, but also inserting and updating the data in the LDM, such as traffic light signal phase information.

When looking at the future of computing devices, we should move over the next five years from a world of mostly standardized devices (computers, mobiles) containing standardized chips and software, to a far more heterogeneous environment with lots of new potential standards. The new wave of small applications and apps stores would define the most relevant standards for services and associated new business models.

The on-going standardization especially on data format to improve interoperability between several systems and public transportation means could be deeply impacted by Open Data[27] and floating data emerging from social networks in the context of multimodal offers.

The Open Knowledge Foundation[28] has identified transport as a typical sector where Open Data could emerge and provide innovation. Instant Mobility has aggregated four kinds of data to deliver urban multimodal best in class services: transport, geodata, environment (partially) and weather (partially).

In the area of Open Data, there is a common understanding that, when public money is used to produce data, these data should be provided as open data. But regarding the definition ***the fact to use, reuse or redistribute them, from a business perspective***, could be subject of a deeper and legal analysis of many different cases.

Because of the high-level of complexity of the transport value chain, and because lots of public actors are using several contracts following their national laws, we cannot just state that transport data are open data.

Dedicated studies should be managed on this topics in the following months, real-time data should push de facto standard when a major actor will emerge.

[27] The definition of Open Data can be summarized by the statement "A piece of data is open if anyone is free to use, reuse, and redistribute it — subject only, at most, to the requirement to attribute and/or share-alike (http://opendefinition.org/)

[28] http://okfn.org/

5. Key exploitable results

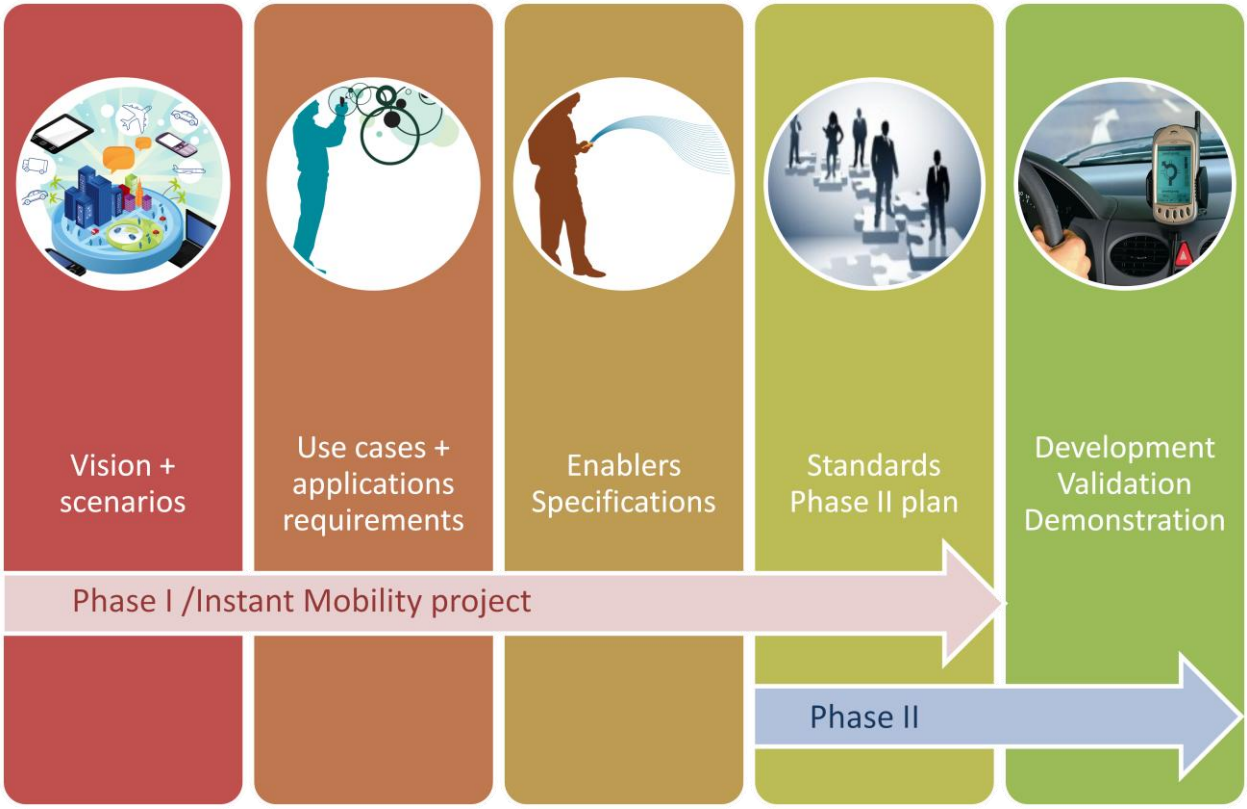


Figure 21: Instant Mobility main results

5.1 Scenario services & related requirements analysis

WP3 has developed a number of parallel but interwoven scenarios, which aim to demonstrate the capabilities provided by the future Internet technologies, with a user and business-centred focus. Each scenario describes a number of Future Internet-supported services that are likely to be used by and to benefit a particular group of stakeholders. While developing the scenarios, functional and non-functional requirements for future internet have been identified and analysed. The Use Case Scenarios definition and analysis is described in three deliverables:

- D3.1 Instant Mobility Use Case Scenarios Definition & Analysis – Preliminary Report
- D3.3 Instant Mobility Use Case Scenarios Definition & Analysis – Final Report
- D3.5 Instant Mobility Use Case Scenarios Functional and non-Functional Requirements

From the five leading scenarios originally described in D3.1, the Instant Mobility services have been re-grouped into three use case scenarios, focused into three different, but related, user/business interests:

- Personal Travel Companion
- Smart city logistics
- Transport infrastructure as a service

Each scenario comprises a set of applications addressing the needs of the different actors involved:

Scenarios	List of Applications
Personal travel companion	Dynamic multi-modal journey
	Dynamic ride-sharing
	Optimized public transport usage
Smart city logistics	Load sharing and optimizing
	Dynamic time/place drop point
	Itinerary booking and real time optimized route navigation
	Eco-optimised driving, vehicle and driveline control
Transport infrastructure as a service	Real-time traffic and route information
	Floating passenger data collection
	Virtualized intersection intelligence
	Cooperative traffic signal control
	Area wide optimization strategies

5.1.1 Personal travel companion

The ***Personal Travel Companion*** scenario aims to demonstrate the capabilities provided by the future Internet technologies for multi-modal travel assistance, mainly in urban and inter-urban areas (long distances journey are also taken into account).

More precisely, this scenario features three main applications aimed to provide to (1) travellers, (2) vehicle drivers and (3) transports operators the benefits of dynamic multimodal journeys planning and follow-up:

- Travellers: it will help them to plan and adjust in real time a multi-modal journey from door to door
- Vehicle drivers: it will allow them to easily book and execute ride sharing on their way to their own destination
- Transport operators: it will provide them with the complete information necessary to initiate demand-driven transportation

The specific services are:

- Dynamic multi-modal journey
- Dynamic ride sharing
- Optimized public transport usage

5.1.1.1 Innovation

- The trip-planning proposal takes into account the current (real time events processing) means of transportation, the traveller's context and preferences, the city rules and the current requirements & constraints.
- During the journey, events occurring on the transport network are monitored and analysed, and if they impact the traveller's journey, an automatic update of his/her planning is sent.

- The driver may also indicate accepting common ride proposals from the Personal Travel Companion, i.e. during the trip (and on a per trip basis rather than for trips made on a regular basis), common rides with traveller(s) on his/her itinerary are proposed to the driver with the rating of the proposed traveller(s). For each agreed proposal between the driver and the traveller, the application manages everything from meeting point, to in-journey security and billing.
- The Dynamic ride sharing application also allows managing the sharing of a vehicle between multiple successive drivers by fixing meeting point for the handover of the car.
- Payment for the multi-modal journey (from door to door) is done with a single electronic ticket on a pay-as-you-go policy (dynamic pricing).
- The collective travel offer of the future is also envisioned to be seamlessly extendable by European-wide cooperation to the geographical and functional areas of responsibility of other (regional) transport operators.
- Highly integrated (all means of transports) information; Instant Mobility will gather all the data and act as intermediate between the different actors (transport, road and parking operators, etc) to relieve the burden of bilateral interfaces.

5.1.1.2 Benefits

- Travellers can easily identify via their mobile phone fastest and most convenient transit options, based upon personal preferences
- Enhanced and demand-driven allocation of transportation means
- Ride sharing is the most immediate mean to enhance urban mobility by using, for a segment of one's journey, the transportation capacity of another vehicle (professional or private)
- Improved service flexibility of collective transport (bus, metro, train, car pooling or taxi) through federation of complementary offers taking advantage of Future Internet capabilities
- Increased efficiency and costs savings (petrol, vehicles maintenance and personnel) from operators' viewpoint, as well as increased profitability as an increase in public transport use would result in an increase on ticket sales; increased reliability and comfort for travellers as collective transport offer, i.e. vehicles, timetables and routes, is matched with actual demand (individual passengers' travelling plans information; occupation of stations, stops and vehicles) and any service disruption is monitored real-time
- Ease of access (easiness to transfer from a transport to another) and use (a unique customer interface for multiple operators); the traveller's user experience is also greatly simplified thanks to single payment for virtual multimodal ticket loaded into one's mobile phone
- Faster, more comfortable, cheaper mobility for travellers and greener mobility for public authorities

5.1.1.3 Risks & limitations

- Availability and usability of the underlying technologies
- Availability, reliability and confidentiality of data
- Data needed from various sources (different sectors as parking, routes, weather, public transports) and various actors (private and public, service and data providers)
- Absence of network coverage (in which case the service that is using this link will then be reduced to a functionality that can be maintained with the reduced data rate. Indeed in Instant Mobility, the use of auxiliary future technology is meant as further enhancement for the accuracy and performance of the envisioned system. The system will continue to work as expected even with lesser accuracy than as first desired).
- Lack of interoperability with existing systems
- The critical mass issue for the ride sharing application, i.e. a sufficient number of drivers offering seats, to enough destinations, at enough times matching a sufficient demand
- Scalability of the system allowing for a growing number of users without the need to review architectural fundamentals
- User resistance due to safety concerns about sharing rides with strangers

Main technical risks identified prior to project commencement, together with the proposed contingency plans, are shown in the table below:

Technology	Risk	Contingency/ "fallback" plan
FI-WARE compliant Cloud computing	Technology not available in time	Might be substituted with similar services from other vendors. Mock-up technologies can be used to emulate the computation and storage functionality, but with capabilities then limited.
Management of semantic, contextual information	This technology bears risks as it depends on other challenging technologies such as mass data computation and localisation	Substitutes can be used for the underlying technologies
Data (Internet) Link, such as S-Band, UMTS	Services rely on fast Internet connections	Faster connections can be substituted by (slower) conventional connections, such as 3G or GPRS or WiFi. The development of the service has to take service degradation into account.
Geo localisation	Enhanced outdoor localisation relies on GALILEO service availability and reliability.	Acceptable outdoor localisation can use reliable technologies such as GPS.

	Indoor navigation standards will be much more heterogeneous, standardisation of currently experimented methods is foreseen. Live tracking of the individual position will also require an internet connection Seamless navigation (everywhere, anytime) would rely on standardised indoor specification of the transmitted signals for hassle-free navigation.	Indoor navigation should use the most reliable method as this increases precision and confidence of localisation. Seamless navigation can rely on approximation of localisation (e.g. building entrance/exit), 3G, WiFi, Bluetooth and pre-compiled detailed maps can help at transferring points based on known coordinates (e.g. building's entrance/exit)
(HD) Video broadcast	The bandwidth for the upstream is limited	Reduced frame rate, quality and buffering mechanism, event detection mechanisms can be used to cope with a lower bandwidth

5.1.1.4 Market perspectives

Future customers for these applications are the main actors they target, i.e. travellers, vehicle drivers and public & private transport operators (including taxi fleet operators).

Today, the existing services close to the Dynamic Multi modal Journey application for the travelers are: pre itinerary planning, ride sharing and parking reservation, road traffic information and guidance services.

Existing services are mainly Collective Transport-centred solutions, e.g. pre trip route planner, pre trip reservation tool, but which are limited to the concerned means of transport. Some of the existing tools are intermodal but do not integrate real time information about updates, unexpected events, traffic state, weather or dynamic timetables; nor ticketing & billing options and they never integrate guidance systems (only pre trip planner).

Guidance services to plan itinerary are proposed through mobile applications or vehicle-embedded navigation systems can offer real time road traffic information, but they never propose ride sharing. Very few of them include public transport traffic and timetables, none include booking. Some of the services also target pedestrians (Google Maps, Mappy) and enable customization and personalization by automatically learning your frequent destination.

However the current trend is that preference shifts from embedded navigation to smartphone integration. The smartphone map audience grew by 39% (according to Comscore in the US), and generally access map services on their device through apps. Technologies are thus emerging, developed by car makers and mobile operators, which allow integrating mobile application into the in-vehicle embedded screen.

The main competitors on that market are the vehicles constructors (On Boar Unit suppliers Personal Navigation Device providers, etc), the map providers and the mobile apps ecosystem. MU, a multimodal mobility service by Peugeot, allows to rent a bicycle, scooter or car with one

single user card. In Europe, several companies among which Comuto, plan to produce predictive traffic information based on ride-sharing journey booked in advance. Lancaster University is working on an application ("Our Travel") that will enable road and train travellers to share information. The British foundation MySociety has launched an application ("Fixmytransport") to enable metro, bus, tramway users to provide feedback on service disruptions to public transport authorities. In France, "CheckMyMetro" or "MetroEclaireur" enable public transport users in Paris to share their comments on traffic, events, etc. IBM is testing smartphone technology that can predict traffic jams and warn commuters before they ever take to the road.

Moreover the European Commission-organised challenge of European multimodal journey planners revealed existing international travel planners covering two or more transport modes to take part in a public mode on the internet. The two winners were Idos, a door-to-door journey planner in the Czech Republic and Slovakia, and Trenitalia's journey planner for train, bus and ferry connections for Italy and neighbouring countries. In the category of "soon to go to the market", were Byebyehello/Zlyck, a journey planner including planning and ticketing services in Germany and Mytripset, by SNCF.

As for ride sharing, many initiatives exist but most of the time for regular commuting journey from home to the office and don't integrate the dynamic aspect of orgnaising a ride within an hour and depending of your location. They do not consider intermodality nor traffic management aspects, and lack payment process integration:

- GéoCar is a solution for commuting between home and work developed by a French start-up Ville Fluide (http://www.villefluide.fr) in November 2011
- The German start-up Flinc (http://www.flinc.org/world) developed a dynamic carpooling app that can be used on smart phones or online to dynamically match drivers and passengers needs (social networking management), send out pick up orders and enable payment without exchange of money between driver an passenger. In October 2011, it claimed 35.000 users in Germany. Flinc is planning to provide a ranking feature.
- The Carticipate app (http://www.carticipate.com) proposes a social networking of car sharing in 59 countries.
- Covivo is the French leader of dynamic ride sharing. It is a dynamic service as you can book a trip 15minutes before the start, but it is not integrated in a multimodal platform. As a traveller you can not plan a trip with on segment in ride sharing with a Covico member.
- Green Monkey (http://www.greenmonkeys.com), a swiss start-up, proposes a dynamic ride sharing system dedicated to comuting from home to work. The price is set by Green Monkey itself (not between the driver and traveller), and the commuters are charged via their Paypal account. However, the dynamic side is underdeveloped as the rides are organized on a calendar basis.
- Karzoo (http://www.karzoo.be) is an initiative by the Luxemburg-based h2a company; it is a 100% free community site which brings together several thousand members. Karzoo allows a certain flexibility and spontaneity of departures, i.e. to make a journey when the occasion arises and not at a predetermined date. No payments can be made via Karzoo. The amount of participation is fixed in agreement between the driver and the passengers, based on tariff recommendations provided by cost calculator proposed on the site. A marking system enables an evaluation and comments on the behaviour of Karzoo members. Karzoo also supplies tailored services for companies and administrations that want to offer a carpool service for home-work journeys to their staff.

- Carpoolplaza (www.carpool.be) is a solution first developed for commuting between home and work, which already gathers 6000 users in the north part of Belgium only; they will soon launch an application for visitors of events such as concerts.
- In Rome, Roma Car Pooling (www.carpooling.roma.it) has been set up by the agency 'Roma Servizi per la Mobilità' to allow workers from the same company to share a ride in the journey between home and work. The system also calculates an estimate of the total cost of the journey to allow people to share this cost. It is also possible to give feedback about the travel companions through a rating, but this feedback is confidential, accessible only by the Mobility Manager of each subscribing company and the team of Roma Car Pooling.
- BlaBlacar.it has around 100.000 users and is part of a network operating in seven European countries.
- http://www.roadsharing.com/it/ is the Italian version of the homonymous website offering hitch-hiking, carpooling and car sharing services for commuters in Europe.
- Jungo.it has conceived a registration card, issued after security checks on police records, to enhance the security aspects of carpooling, and also offers a call centre to report issues and problems.
- End of 2012, the "social GPS" Waze updated his app version with the ability to share trips with friends, track them when they are reaching your destination and send them request to get a ride (even if they aren't users of Waze).
- carticipate.com proposes a social network of car sharing in 59 countries. The Company is building a location based mobile social network for ride sharing, ride combining, and car pooling.
- In the US,
    - Lyft, the new service of Zimride was launched in May 2012 in the San Francisco bay area, and SideCar was launched in June 2012.
    - A real trust network was built for Zipcar services, notably using Facebook facilities and e.g. the possibility to listen to vocal messages to know better the person before ridesharing, to know the ranking (historical rides, past withdrawal, etc.)
    - Avego has implemented the largest real-time ridesharing project to date in Santa Barbara, Sonoma County, Contra Costa County, and Marin County, California. It is administered by the Ministry of Metropolitan Transportation Commission of San Francisco Bay area.
- Other emerging P2P (People to People) car pooling tools include Relayrides, JustShareIt, Getaround in the US and Zilok in Europe.

Existing pre-trip planning and reservation solutions are proposed by the transport owner free of charge. There is a fee for the apps, though some of them are proposed free of charge based on advertising revenues. Funding of Green Monkeys is based on immediate revenue based on business licensing (B2B) and on recurring revenue thanks to the commissions on the sharing of costs between passenger and driver (B2C).

The channels used are the internet websites of the transports operators and apps (through (mobile network operators, handset vendors and on-device app stores.

The new value chain would imply more interactions between the actors, but with a centralization of data flows due to the new business roles played by the new entrants:

- the **data broker and integrator**, i.e. the intermediate new actors between the existing actors of the present value chain:
    - the data broker plays the role of conductor for multimodal journeys services orchestration and invoicing office
    - the integrator role is to collect and integrate data from local transport providers and customize the service to the local need, thanks to specific developments and parameters of the Instant Mobility Platform
- the **platform provider** is responsible for the building, hosting and maintenance of the Instant Mobility Platform that contains a real-time and multimodal navigation and planning software, and includes Generic Enablers from the FI-WARE core platform
- Software/apps providers
- **Data providers** such as public and private transport operators, parking management companies, road operators but also travellers themselves (the aggregation of these various data sources providing the added value)
- the raising role of the **public authorities**, defining rules and incentives for the mobility policy in terms of infrastructure planning, public transport organisation, urban traffic management, etc.
- **check in, check out and billing** service and device providers (as NFC or any device enabling to check in and out) and the financial establishments
- the central role played by the **users** (drivers and travellers) to make user-generated content:
    - defining and ranking services
    - ride sharing proposals
    - anonymous sensors for traffic forecast and real time data

The service is planned to be free for the end-users in a first step, and they receive rewards to encourage them to use it. Once the community will have reached the critical mass, the user will have to pay a monthly fee to use the service. In return, he/she will directly benefit from more efficient journeys, including cost-wise.

The application, thanks to localization and the profile of the traveller, may propose, before and along the trip, banners of shops he will approach. The advertising revenues will be based on banners (cost per banner proposed) and a subscription fee for the retailers.

The breakthrough of integration of heterogeneous data is the key value of the Instant mobility project and the real time characteristic of data may allow to build a new way to create value with events (to be able to monetize each event: a traffic jam information, a point of interest, a delay of public transports, etc.)

License models are required because the system needs to collect data from the different transport operators, traffic and road operators and potentially floating data. All these data should be normalized to ensure interoperability and a competitive access to the new market. A specific license model could be defined to access real time data including how it is possible to store them or manage some statistical models on top of them, or just to use them as a real-time flow of information without storage.

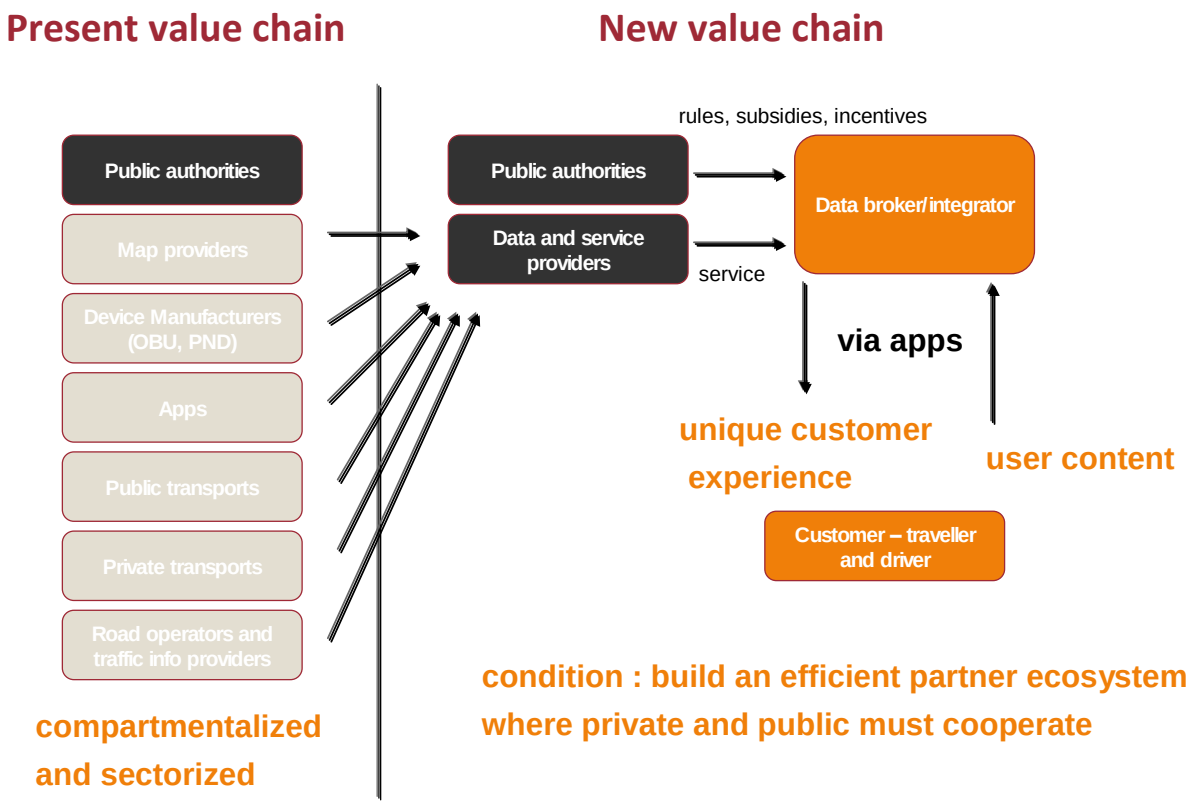


Figure 22: Instant Mobility value chain

The Traveller Companion seems to meet the maturity of customer for this kind of service:

- the present services aren't aligned with the customer needs for multimodal journey and ride sharing;
- the spreading of smartphones: today mostly used for social networks (IDG study) but the proportion of mobile users who access maps are increasing (France: 13%, Europe 15%) – these services also represent a business opportunity for mobile manufacturers and operators to develop the “next generation” mobile connected devices;
- the inclination to belong to a community and social networks through Internet

The growing use of nomadic hand-held devices like smartphones, tablets and PDAs shall facilitate and encourage the wide diffusion of these Instant Mobility services as they address people travelling from one place to another. Nevertheless, it will be important to be able to use the services (at least for a part of their functions) also on other devices like Personal Computers, interactive kiosks and also seamlessly transfer sessions from one device to another. Beside devices also Networks Operators will have a key role in enabling Instant Mobility scenarios as they may expose valuable information (individual or aggregated) to services and device applications.

5.1.1.5 Socio-economic impacts

Optimization of all transportation means and green transport is a common concern for all citizens whether travellers or drivers. Future Internet applications will help address some of today’s main

societal challenges such as the reduction of traffic congestion and its carbon footprint, which in turn mean saved time and improved global quality of life (health and well-being) due to reduction of the noise and the pollution rate. The time and stress avoided in congestion and parking search will also improve the attractiveness of the territory.

By creating communities of travellers with common needs or travel patterns (e.g same employer, same neighbourhood, common hobbies, favorite shops, etc) could reduce resistance about safety concerns of sharing rides with strangers. Travellers with special needs would find the assistance they need provided automatically at each point in their journey, greatly improving their mobility and accessibility. The Social Network approach to involve users as active members of the transport ecosystem is likely in the long term to launch a "Transport 2.0" wave of innovative internet-based services. This will offer particular opportunities for SMEs to play a part in the Transport and Mobility ecosystem, stimulating the co-creation of greener and smarter Transport and Mobility services.

Collective means of transport (e.g. buses, taxis, trains, shared cars) could become much easier to use, more flexible and more reliable, leading to a modal shift away from car and towards collective modes. However to allow PT Operators to change dynamically vehicles itineraries, Public Authorities will need to establish new mobility rules and regulations in a city. Moreove a single ticket would be another trigger to encourage public transport usage: 50% of EU citizens (car drivers and public transport travellers) declared that they would definitely consider using public transport more frequently if they could buy a single ticket for their complete journey that covered all public transport modes. Moreover we can imagine that the ability to pay that single ticket with one's mobile phone would be an additional attractive factor.

Internet-based demand management could lead to public acceptance of rationing of scarce transport resources, especially if coupled with provision of high-quality collective transport alternatives and with a scheme of mobility credits that would reward environment-friendly behaviour. Incentives such as car pool or HOV (high occupancy vehicle) lanes or parking spaces, targeted directly at travellers or their employers, could help reach the critical mass of drivers offering seats, to enough destinations, at enough times to sufficient interested passengers. Such schemes require a coordinated approach between employers and authorities to be integrated into mobility strategies and policies.

Because Public Authorities deliver also many subsidies to support transport networks as well as many other citizen services, one option to push to a quick adoption of multimodal services and to decrease in the same time the public budget would be a cross-awarding system. An example is that citizen who have children and would regularly use multimodal services could receive awards as a sort of credit for services like school canteen, communal swimming pool, etc.

Moreover behaviour change should be encouraged by emphasizing the impact of collective efforts in a tangible way, as well as how it can address users' specific needs. Another means to foster social change is to set up challenges[29] in which users measure up their environmental savings against each other or per areas, cities, etc.

Another socio-economic impact that is linked to the use of open data is governance: open data drive greater transparency and accountability, leads to greater inclusion of citizens in decision-making, but also support innovation, both in processes of governance and in the delivery of public services.

[29] See http://www.abeonagames.com/2013/04/07/transport-game-in-review-waze/, which confirms this assumption.

The collection and storage of personal data for context-adapted and personalised travel, as well as the real-time knowledge of individual travellers location during journeys raise strong concerns among citizens regarding privacy. Many technical enablers are under developpement to guaranty anonymity such as homomorphic encryption functions that enable to aggregate data in a blind world. The Identity Management Broker Generic Enabler of FIWARE will guarantee and provide authentification authentication mechanisms (OAuth, OpenID) and user profile management. The Privacy Generic Enabler could also be used in order to provision pseudonym certificates and location monitoring to ensure privacy with regard location information. Moreover, the personal travel companion will have to integrate specific tools and design the service in order to reassure travellers about the privacy and anonymity of their data.

The dynamic ride sharing application which is based on ranking via social networks will have an influence on the future use of these media, while at the same time, the current explosion of social media are creating a fertile ground for the development of such application. Tools that have emerged[30] enabling travellers to report problems encountered during their journey and provide real time information on traffic and any unexpected events in e.g. public transports, show a real behaviour change of the travellers now willing to practice ranking as commonly used in social networks. The countereffect of these media growing success is that it also gives new opportunities for crime, e.g. cyber fraud, stealing identities, etc.

5.1.1.6 Further research needs

Elaboration of an evaluation plan including KPIs, test procedures (preconditions, test sequence, and measures to be taken) that allow to assess Instant Mobility system.

Two issues have to be developed in future projects: first, how could it be possible to build multimodal services on top of several communities launch by different applications, especially when these applications are targeting a specific part of the multimodal services (pre-trip or on trip, public transports or private drivers...), second, the management of floating data from several social networks could provide a new but very heterogeneous transport environment without any standardization which could limit the interoperability and the market to reach a mature level.

5.1.2 Smart city logistics

The ***Smart city logistics*** scenario aims to demonstrate the capabilities provided by the future Internet technologies for improving transport operations with respect to safety, efficiency, environmental performance and quality of service.

More precisely, this scenario features four applications aimed to provide to (1) vehicle drivers and (2) transports operators the benefits of optimised driveline control, vehicle utilization and pick-up/ distribution operations:

- vehicle drivers: contribute to sustainability in urban transport operations, not only from an environmental perspective but also from a social and financial perspective;
- transport operators (logistics provider or express courier): enhance end-customer quality of service through transport flexibility and adaptability.

The specific services are:

- Load sharing and optimising

[30] “Check MyMetro” in France; http://www.fixmytransport.com (UK); in Boston (USA), the mobile app “Talk to the T” enable the travellers to send warnings to the PTO by twitting

- Dynamic time/place drop point
- Itinerary booking and real-time optimized route navigation
- Eco-optimised driving, vehicle and driveline control

5.1.2.1 Innovation

- Instant Mobility approach connects all sources of information available, which is not done in any system know at this time
- Another important part of the value proposition is due to the choice of the application to propose a service in urban area in the last kilometre perimeter (instead of long distance delivery)
- Itineraries planning systems take into account the expected and actual traffic conditions, e.g. rush hours, special events like concerts, sport competitions, etc, so that distribution vehicles can avoid traffic jams
- Itinerary booking service integrated with a real-time traffic route navigation service (through the vehicle internet connection) so as to modify in real-time the planned routes and itineraries in case of any unforeseen event
- The navigation system provides the Driver with directions based on real time traffic state information coming from various sources such as traffic planners but also other equipped vehicles and the infrastructure
- Based on real time traffic state information, it may be possible to let another truck take care of some originally planned pick-up/drop-off missions or to re-arrange as far as possible the order of the stops. On the opposite, if traffic runs smoothly, it may be possible to add stops to the itinerary, based on new customer requests
- The load sharing and optimizing application enables delivery drivers and courier companies to synchronize the delivery and collection of parcels in town with their movement by contractualized parcel exchanges between trucks "on the fly"; vehicles communicate their itineraries to each other and suggest goods swapping if certain criteria indicate the possibility of more optimal itineraries
- Dynamic delivery time and place based on information shared by consignee on his or her whereabouts, location and plans, which can be taken into consideration when the transport operator plans the delivery of the goods (even more dynamic rescheduling is also possible if it is realised that the consignee is close to the goods at some point during the transport, by comparing the vehicle location to the location of the consignee, shared by e.g. the consignee’s Smartphone)
- Eco-driving support to consider not only information from vehicle sensors but also information about e.g. topology, traffic conditions and performance of other drivers
- Eco-driving advice based on information about traffic light signal phase timings (SPAT) and intersection geometries (TOPO). The traffic light signal phase timings can be received either from physical road side units, over the 802.11p protocol or from virtual road side units in the cloud.
- Eco-driving support not only through display advices but also through haptic pedal control preventing excess acceleration unless needed

5.1.2.2 Benefits

- Enhanced city logistics operations with respect to safety, efficiency, environmental impact and quality of service
- More detailed and accurate information can be provided in real-time
- Better coordination and enhancement of activities such as goods consolidation
- Maximized vehicles efficiency through better resource utilization
- Enhanced flexibility and adaptability with regards to changing prerequisites and unexpected events
- Lower operation costs of transports and improved competitiveness and profit margins for transport operators, cargo owners, etc.
- Reduced congestion, noise and environmental pollution
- Enhanced end-customer quality of service through on-time deliveries as well as transport flexibility and adaptability (in terms of time and location)
- Calmer and more predictable traffic flows
- Enhanced mobility and quality of life in the cities

5.1.2.3 Risks & limitations

- Availability and usability of the underlying technologies
- Underlying technologies not available in time
- Security of data transfer (faked information compromising data integrity)
- Robustness and reliability of data
- Absence of network coverage (in which case the service that is using this link will then be reduced to a functionality that can be maintained with the reduced data rate. Indeed in Instant Mobility, the use of auxiliary future technology is meant as further enhancement for the accuracy and performance of the envisioned system. The system will continue to work as expected even with lesser accuracy than as first desired).
- Large bandwidth and high computational power are a prerequisite for communication and processing of the large amounts of data needed
- Scalability of the system allowing for a growing number of users without the need to review architectural fundamentals
- Interoperability of vehicle communications systems from different providers

Main technical risks identified prior to project commencement, together with the proposed contingency plans, are shown in the table below:

Technology	Risk	Contingency/ “fallback” plan
FI-WARE compliant Cloud computing	Technology not available in time	Might be substituted with similar services from other vendors. Mock-up technologies can be used

		to emulate the computation and storage functionality, but with capabilities then limited. FI-WARE Cloud Hosting services should provide relevant hosting capabilities managing directly scalability and availability, at least to provide real-time updated environment to support multiple instances of the server side.
Management of semantic, contextual information	This technology bears risks as it depends on other challenging technologies such as mass data computation and localisation	Substitutes can be used for the underlying technologies
Data (Internet) Link, such as S-Band, UMTS	Services rely on fast Internet connections	Faster connections can be substituted by (slower) conventional connections, such as 3G or GPRS or WiFi. The development of the service has to take service degradation into account.
Geo localisation	Enhanced outdoor localisation relies on GALILEO service availability and reliability. Indoor navigation standards will be much more heterogeneous, standardisation of currently experimented methods is foreseen. Live tracking of the individual position will also require an internet connection Seamless navigation (everywhere, anytime) would rely on standardised indoor specification of the transmitted signals for hassle-free navigation.	Acceptable outdoor localisation can use reliable technologies such as GPS. Indoor navigation should use the most reliable method as this increases precision and confidence of localisation. Seamless navigation can rely on approximation of localisation (e.g. building entrance/exit), 3G, WiFi, Bluetooth and pre-compiled detailed maps can help at transferring points based on known coordinates (e.g. building's entrance/exit)

In order to address requirements on scalability and availability of the server-side systems, a multi-instance deployment can be used, where a common front-end, which exposes the services and applications to the end-user, is accessing different instances of the computational intensive

components, which otherwise would have caused performance bottlenecks. To further increase availability, traditional load balancing technologies can be applied to the front-end, since it is based entirely on web-technologies.

5.1.2.4 Market perspectives[31]

The use of Future Internet technologies can lead to new relationships between logistics, traffic management and production supply chains.

The main actors in the value chain are:

- **logistics operators** providing services and complying with regulations set up by **public authorities** to reduce the impact of trucks on traffic, infrastructure and environment
- the **transport planner** and the **driver** who are the two main users of the itinerary booking application, which helps them plan and adjust the efficiency of the routes. In addition, information about the planned itineraries can also be sent to the **traffic manager** for traffic flow optimization
- **Haulier** and transport buyers selling and purchasing transports
- **fleet managers**, who benefit from the eco-optimised driving application, canmonitor the performance of their drivers and vehicles, and also compare it with other fleets' fuel consumption data (for similar type vehicles, with a similar load and driving on the same route) uploaded to the Eco-Drive Portal (web-based interface)
- **consignor** (manufacturer, Distribution Centre), i.e. sometimes but not always the transport booker who books a transport with the transport operator, and **consignee**, i.e. goods receiver (customer or store)

Among existing initiatives, the project LOGeco[32] targets the "last mile" distribution of goods, trying to make it sustainable from the point of view of urban mobility. It aims to develop a model, with solutions and short/medium term recommendations, able to comply with the regulations of the Public Administration, with the industry needs (i.e. in terms of revenue), and also considering the criteria of environmental, social and economic sustainability.

Purchasing goods online has become routine to many of us but having them delivered can be trickier. The consignee is either asked to collect the ordered goods at a central pick-up location or is offered a fixed delivery point, i.e. either work or home, with some constraints though, e.g. several hours long time-slot during which the consignee is expected to be at delivery place. Hence the flexibility brought in by dynamically pointing out the right time and place for getting delivered is definitely a selling argument. Business models for this kind of application can be for example based on charging an additional fee for opting for flexible time and location of the delivery.

While take up of the "vehicle as sensor" approach can only be expected if new onboard devices emerge on the private car market, as connectivity is already available in many professional fleets, especially for trucks, this type of services could appear earlier in this area.

Other factors of market take up of such applications include:

- reliability in reducing duplicated travels

[31] D6.2 Business case analysis was limited to Scenario 1 "Personal Travel Companion". The final report (D6.5) will contain a similar detailed analysis as in chapter 5.1.1.4 for Scenario 2 and 3.
[32] www.logeco.it

- ease of access and use (a professional unique platform, with the same look and feel and personalised through preferences)
- security guarantee (that all registered participants have no criminal record)
- efficiency (in reducing congestion)
- acceptability and implication of public authorities and drivers

There are two main existing websites for organizing the load sharing among the logistics operators, drivers and couriers in Europe. However they never integrate traffic simulation and other info that could influence the route and final pricing:

- **Timocom** where both freight and vehicle spaces have successfully been offered since 1997 for trading in the exchange. The tendering platform has been developed to optimise the European contract business for the whole of the transport chain. The platform simplifies business processes between hauliers, logistics companies as well as the shippers and makes business more productive and more transparent
- **Wtransnet** was founded in 1996 as a freight and truck exchange platform. The website registration costs approximately € 120 per month and the rest of benefits depend on each negotiation between companies (these are not an intermediary and do not charge any commission for the contracts that are performed within the system. Likewise, there is no additional charge for searches, queries or offers, either loads or trucks.

5.1.2.5 Socio-economic impacts

City goods distribution contributes to problems such as pollution, noise, congestion and unsafe environments within cities. Thus solutions that reduce the amount of vehicles in city centres while increasing their efficiency, hence reducing these problems, which affect citizens' mobility and health, can only be received favourably.

Vehicles will also build a new type of social network not dedicated to people but as smart resources which could apply some rules and manage automatically some actions.

However the real-time location or personal calendar sharing of the consignee may raise concerns and objections regarding privacy.

The enhanced flexibility of delivery options and consequent customer service quality would probably have a growing impact on people's online shopping habits.

5.1.2.6 Further research needs

Many European projects have conducted research in urban freight solutions, and a large majority of them focused on how UCC (Urban Consolidation Centers) could help to optimize goods flows entering cities. More than 100 UCCs have been trialed across Europe, however its main challenges have not yet been solved (business model to sustain them when public subsidies are not in place, risk and benefit sharing among stakeholders, sustainable collaboration among competitors, etc). Hence, deeper analysis and studies need to be carried out around last mile solutions for urban freight, more focused on improving the performance of urban logistics once goods have entered the city.

Other specific needs include:

- HMI for eco driving support
- Resource utilisation estimation (e.g. automatic determination of available truck capacity in terms of volume)
- Automatic determination of vehicle utilisation, i.e. find out an optimal way for city logistics vehicles to determine unused load capacity
- Intelligent goods, using IP-based smart objects, i.e. find out how to apply smart object technologies such as IEEE802.15.4, IPv6 and 6LoWPAN in a city logistics context

5.1.3 Transport infrastructure as a service

The ***transport infrastructure as a service*** scenario aims to demonstrate the capabilities provided by the future Internet technologies such as cloud data storage, cloud computing virtualization or services-in-the-cloud for dynamic & integrated traffic monitoring, management and control, mainly in urban and per-urban areas.

More precisely, this scenario features five applications aimed to improve information collection & exchange and service provision for more dynamic and efficient transport operations, by bringing the following advantages:

- to the Traffic Operator:
  - reduced installation and maintenance cost of local hardware
  - seamless configuration and upgrade possibilities (as well as intervention in case of faults)
  - more scalable and modular systems for traffic control centres
- to the User:
  - improved safety and fewer accidents at controlled signalised interactions
  - reduced delays and congestion
  - improved energy efficiency

The services contain both information collection and exchange and service provision:

- Real-time traffic and route information
- Floating passenger data collection
- Virtualized intersection intelligence
- Cooperative traffic signal control
- Area wide optimization strategies

5.1.3.1 Innovation

- Use of Future Internet technologies such as cloud data storage, cloud computing virtualization for dynamic in-the-cloud traffic management
- Integration of multiple sources of traffic and mobility data (from existing infrastructure-based technologies and new sources such as social networks, Wi-Fi devices and floating car data) to provide innovative services such as: a complete representation of current traffic conditions over the network, travel time estimations and forecasts, wide area strategic traffic control, Real Time Traffic Information (RTTI) provision for end users and multimodal services, and dynamic routing guidance depending of the road network condition in real time

- The aggregation of data from different and innovative sources allows public authorities to give traffic information, forecasts and services (e.g. priority, green wave) in unmonitored zones, e.g. linking to third-party data that directly or indirectly collects traffic information (e.g. FCD, social network info, street light as sensor, etc) through specific APIs that link cloud content providers. The innovation within Instant Mobility is to combine different data sources to utilize all available tracking of vehicles and person travels
- In the "Real-time traffic and route info" application, the vehicle acts as a probe for traffic estimation sending data to a traffic service on the Internet; these data are mashed-up with other sensor data coming from the road infrastructure to give real-time traffic conditions over the full road network. Drivers can receive the information using their personal device through an on-line and updated map including traffic data (continuous map download and updates). This will enable user-transparent communication between the vehicle, the personal device and the TMC, which will receive data for traffic estimation (position, direction, speed, use of braking pedal, gears info) not available nowadays.
- The "Floating passenger data collection" application will provide passenger density and position measurements over the transport network, and allow to perform accurate predictions on passenger density, based on a wide range of input data.
- Cooperative traffic signal control creates ad-hoc networks in the cloud between clusters of vehicles and the traffic management infrastructure, to define speed recommendations for guaranteed green light and adapt traffic signals to real time demand
- The actuation services will run optimal policies that take into account the specific requirements of each zone, region or city

5.1.3.2 Benefits

- Measurements on passenger density on their network will allow Transport Operators and Organizing Authorities to optimize and regulate instantaneous quality of service
- Cost savings because transport agencies will be able to use existing infrastructure-based technologies instead of investing in new dedicated traffic management platforms
- Reduced maintenance costs (local hardware currently resides in a hostile environment, so less hardware will result in less maintenance)
- Seamless configuration, installation and upgrade possibilities
- More scalable and modular systems for traffic control centre
- Optimized routing based on up-to-date map including real-time traffic data
- Optimized traffic control strategies and network operation, hence of the traffic service, based on collected vehicle data
- Enhanced safety by avoiding sudden speed decrease or stops through speed advice
- Enhanced traffic flow fluency thanks to harmonising vehicles speed and accurate RTTI for mobility services such as route guidance or eco-driving support
- Improved energy efficiency

5.1.3.3 Risks & limitations

- Availability and usability of the underlying technologies
- Availability (from infrastructure, vehicles and other data sources) and reliability of data
- Underlying technologies not available in time
- Absence of network coverage (in which case the service that is using this link will then be reduced to a functionality that can be maintained with the reduced data rate. Indeed in Instant Mobility, the use of auxiliary future technology is meant as further enhancement for the accuracy and performance of the envisioned system. The system will continue to work as expected even with lesser accuracy than as first desired).
- User acceptance with regards to their location being tracked and confidentiality of the data (used for other purposes than traffic control, e.g. speeding enforcement)
- Security of onboard systems against malicious attacks
- Robustness of the system (working with the maximum road traffic capacity, minimum 50000 vehicles and 10000 road sensors)
- Lack of interoperability with existing systems
- System failure/malfunction
- Organisational complexity

Main technical risks identified prior to project commencement, together with the proposed contingency plans, are shown in the table below:

Technology	Risk	Contingency/ "fallback" plan
Cloud computing (computation) distributed, partitioned data (storage)	Technology not available in time	Mock-up technologies can be used to emulate the computation and storage functionality. Capabilities will be therefore limited.
FI-WARE PaaS Management GE	Scalability	Scalability in terms of resources needed by each VM is addressed by using PaaS Management GE, which is able to provide to the users the facility to manage their applications without worrying about the underlying infrastructure of virtual resources (VMs, virtual networks and virtual storage) required for the execution of the application components. Thanks to the integration of the PaaS Management GE, the scalability requested by large systems (e.g. a whole city) can be reached by specifying a proper AD.
Management of	This technology bears risks as	Substitutes can be used for the

semantic, contextual information	it depends on other challenging technologies such as mass data computation and localisation	underlying technologies
Data (Internet) Link, such as S-Band, UMTS	Services rely on fast Internet connections	Faster connections can be substituted by (slower) conventional connections, such as 3G or GPRS or WiFi. The development of the service has to take service degradation into account.
Geo localisation	Enhanced outdoor localisation relies on GALILEO service availability and reliability. Indoor navigation standards will be much more heterogeneous, standardisation of currently experimented methods is foreseen. Live tracking of the individual position will also require an internet connection Seamless navigation (everywhere, anytime) would rely on standardised indoor specification of the transmitted signals for hassle-free navigation.	Acceptable outdoor localisation can use reliable technologies such as GPS. Indoor navigation should use the most reliable method as this increases precision and confidence of localisation. Seamless navigation can rely on approximation of localisation (e.g. building entrance/exit), 3G, WiFi, Bluetooth and pre-compiled detailed maps can help at transferring points based on known coordinates (e.g. building's entrance/exit)

5.1.3.4 Market perspectives[33]

The main actors involved in this scenario–and thus main consumers of the services involved–are data and service providers (including Cloud services, i.e. servers and storage providers), integrators using mobile data (e.g. V-Trafic), traffic operators (road operators and local governments via traffic centres), public transport operators and end-users, i.e. travellers and drivers.

"*The spread of cloud-delivered services such as SaaS (software as a service) is comparable, in terms of potential disruption to the value chain, to the appearance and general uptake of IT outsourcing services around 20 years ago. In the next 5 years, cloud computing is expected to have a considerable impact on the business and consumer markets*. "[34]

[33] D6.2 Business case analysis was limited to Scenario 1 "Personal Travel Companion". The final report (D6.5) will contain a similar detailed analysis as in chapter 5.1.1.4 for Scenario 2 and 3.
[34] FI3P DELIVERABLE 2 - The European Internet Industry and Market – Appendixes, p 34.

Cloud services penetration rates across Europe have grown from 2% in 2009 to 9% of the software market in 5 years.[35]

The use of Future Internet technologies can lead to new relationships between traffic professionals and end-users. Both social media as well as smartphones may serve as a basis for a future service providing multimodal travel information to travellers and at the same time extracting floating passenger data. Information from Google phones is an example on how travel information may be extracted from users. Scenario 3 services will use information from both vehicles and infrastructure to formulate strategies to achieve the optimization of the network operation. As such, they will enable the creation of a new cooperative systems market. For the IT industry, Future Internet is an opportunity to increase the range of applications and services in their offering, and to open their market to new user categories. For public authorities, the biggest attraction resides in the prospective hardware and maintenance cost savings. Indeed, nowadays one of the most significant barriers to enlarge urban traffic control systems is represented by their development, installation and maintenance costs. With cloud technologies utilisation, the total amount of installed equipments will be reduced only to communication devices, enabling Public Authorities and Traffic Managers to increase the scalability of their systems with cost-effective solutions.

The “Area-wide optimisation strategies” application allows collecting data from different sources and mashing it up, analyzing and summarizing it into useful information that can feed algorithms and traffic management strategies. This will open a “data market” between Public Authorities and public/private Data and Service Providers, but also for other 3rd parties, which directly or indirectly collects traffic information in a city/area, but do not share them with the traffic manager, mainly due to the lack of specific interfaces, to create specific APIs that link cloud content providers and allow them to make use of data from other innovative sources (e.g. Bluetooth/Wi-Fi devices, crowdsourcing, XFCD, etc).

The European car industry (Car2Car Communication Consortium) is eager to promote cooperative solutions for the upcoming new models implementing cooperative feasibilities from 2015 on.

Existing real time traffic information-provision tools do not include forecasts and real time events information at the same time. Most of the time they only cover main roads or are not precise, and they don't always offer an alternative route.

Commercial actors like Google and TomTom have some services for travel time estimation in some cities, but the user base is still too weak to give correct and up-to-date estimates.

Existing local traffic information as referred to by the Instant Mobility pilot cities can have a high market penetration for single travel mode like car or bus. They are however lacking the multimodal focus that is needed to change the travel behaviour within an area/city. A successful combination of multimodal travel information with individual guidance, are considered as highly likely to get a significant pan European market penetration.

There are no existing services collecting real-time multimodal floating passenger data over the transport network. Several partial solutions contain partial floating traveller information through ticketing like for public transport or by tolling/traffic counts, but the solutions are lacking origin, route and destination information.

There are no current applications that have the traffic control operations hosted in the cloud, and at the same time use the adaptive and distributed technique. Traffic signal systems in certain cities

[35] FI3P DELIVERABLE 2 - The European Internet Industry and Market, p 102.

or areas are optimising based on average traffic flows but while the signals adapt to serve demand, they do so through a responsive process rather than a real- time adjustment method.

5.1.3.5 Socio-economic impacts

Transport and mobility are fundamental and vital for the economy and for Europe. Indeed efficient and sustainable transport and mobility is essential for participating competitively in the world economy, supporting the prosperity of Europe. Transport and mobility has grown substantially over the past decades, expanding infrastructure and involving more and more Information and Communication Technologies. Nevertheless, it is widely acknowledged that Internet of Services is not so present to improve how people and goods are travelling with impacts at environmental, social and economic levels. Technological innovation can support the transition to more efficient and sustainable transport system.

However the collection and storage of personal data for context-adapted and personalised travel, as well as the real-time knowledge of individual travellers location during journeys raise strong concerns among citizens regarding privacy.

The dematerialisation implied by the diffusion of Cloud Computing and the possible concentration of data centres will contribute to increased energy efficiency and connected low-carbon economy.

5.1.3.6 Further research needs

The new onboard devices that should emerge on the market to enable the “vehicles as sensors” cooperative approach should be supported with an adequate diffusion of broad-band mobile communication networks (e.g. 4G or LTE), or even with short range dedicated intersection communication technologies.

Trondheim (Norway) is a good candidate for further evaluation and testing of virtualized intersection intelligence as it is already implementing adaptive signalling in most areas of the city. Especially the integration between adaptive signalling and bus priority may benefit from shifting the optimisation from the local level to a solution hosted in the cloud.

The data collected from the various sources are stored in a fusion database server (which needs to be further specified in next research projects, according to the specifications coming from other Scenarios and usage Area Projects), in order to make them accessible to all other modules of the system and to external applications.

Cloud deployment of the Traffic Management Centre Fused DataBase component should be further investigated in next phases, according to the specifications coming also from other Instant Mobility Scenarios, which are the users of the stored data. To this end, the use of IaaS DataCenter Resource Management, BigData and Object Storage GEs seem to be promising.

5.2 Enablers

Instant Mobility will define and specify essential “enablers”, i.e. generic and transport-specific technologies and components, but also the architectural requirements, needed to support the Instant Mobility services.

5.2.1 Requirements[36]

When developing the enablers, functional and non-functional requirements for the applications should be taken into account.

Deliverable D3.3 has been submitted that provides functional and non-functional requirements for the three development scenarios and their applications. A functional requirement defines a function of a software system or its component. A non-functional requirement presents constraints on the design or implementation of a system, e.g. performance requirements, security, reliability, scalability, interoperability, security, privacy, maintainability and resilience.

The results of D3.3 have been presented at a stakeholder workshop held in Rome on 20 March 2012. The workshop was hosted by ATAC (Rome Public Transport Company) and attended by representatives from different sectors covering local authorities, public transport operators, travel information service providers, payment service providers, mobile phone operators, etc.

Stakeholders at the workshop generally agreed with the functional and non-functional requirements presented in the deliverable. The following topics have been given the most attentions by the workshop attendees:

- **Privacy**: although the workshop attendees have satisfied with several non-functional requirements addressing privacy issues, it has been highlighted that any of the Instant Mobility must not become a 'big brother' system. Privacy should be respected in both development and operation stages. A user should have no fear of privacy violence while using any of the services;
- **Cost for users**: although cost issue is not in the scope of this deliverable, there was an intensive discussion on cost. Since many of the services need continued communication between a traveller and service operators, there were concerns regarding roaming fees if the traveller would use such a service abroad;
- **Cost for the platform**: although the workshop attendees were impressed by the proposed functions of the three scenarios, a question was raised about who should pay for setting up the platform. Considering the current economic situation in many European countries, it is unrealistic to expect public funds. Although such services may have potential to increase number of public transport users, it may still be difficult for public transport operators to pay for the platform. An estimation should be performed to get a better understanding of the magnitude of these costs;
- **Personalised services for professional drivers**: although many applications for travellers provide personalised services, i.e. based on user's profile and preference, it is generally not the case yet for professional drivers. If an application does not take their own personal preferences into account, drivers might not follow the instructions, thus reducing performance and benefit of the application;
- **Floating professional driver data collection**: while the application of 'floating passenger data collection' has been appraised as an efficient way to collect information on usage and performance of public transport, 'floating professional driver data collection' was proposed. It has been noted that many professional drivers have good knowledge of the network and vehicle operations which is valuable experience to be shared with others.

[36] The actual requirements are included as possible "risks & limitations" (if not met) in the corresponding sub-chapter of each scenario description in chapter 5.1.

Not functional requirements	How is addressed
Security **Privacy**	The single sign-on concept, described in authentication rules been provided to FI-WARE as a specification in the form of EPIC It is recommended that strong authentication uses SIM resources It is recommended that the SIM is the security element for card emulation application through proximity Data context/management and security generic enablers from FI-WARE may be used to store users sensible data
Expandability and Interoperability	Communication from the mobile terminal to remote service must use standard interface e.g. REST Where possible, data format over REST interface should follow standard formats (e.g. TPEG for traffic information) CDI approach for application. Usage of HTML5 and javascript.
Usability	It is recommended that user interface is designed with minimal and clear interaction to take care of driver distraction. Mobile terminal usage inside car must use OBU display (MirrorLink usage), where possible, with adapted interface.
Performance	Geolocation has to use all possible data available (mobile terminal GPS, OBU GPS, network based location).

5.2.2 Specifications

The objective of the "Future Internet Enablers" work package (WP4) is to derive, from the Use Case scenarios analysis and the Future Internet technologies roadmap produced by WP3, the technical specifications of the components necessary to implement the Instant Mobility scenarios. These components, called "enablers" (either generic or domain-specific), can be either physical hardware modules or services built on top of these enablers.

These enablers have been described with special attention to the necessary communication properties and interfaces within a system and in its interaction with external services. The environment in which the platform will be deployed has also been defined and the requirements of these external actors to interact and take advantage of the platform.

In order to implement different types of services for the users, either travellers (using public transport means) or (car or truck) drivers, all involved actors should be informed and this can be done through personal or handheld devices: information shared by travellers about their planned and ongoing trips can enable drivers to share their vehicle trip as well as system wide optimization for travel time, costs or pollution; the consignors of delivery companies can benefit from additional data they, or their applications, can obtain from the vehicle itself. These data can, in turn, be useful to the service centres which need as much information sources as possible.

Nowadays, the in-vehicle use of Internet-based services is very limited: typically, drivers are provided only with few information services, made available through “connected” on-board devices (i.e. having an embedded modem offering mobile connectivity). Examples of these are the available traffic information services. The provision of information could be based on driver’s vehicle OBU using the internet connection of the nomadic device to interact with multi-modal planner in the cloud. This model could also be used to provide drivers with warnings and suggestions or to feed the on-board navigation system with quasi real time information enabling dynamic navigation features.

Currently, the only active interactions between nomadic devices and the vehicle can be found in Consumer Electronics-oriented applications (i.e. infotainment), but are limited to enabling the use of standard phone functionalities through the vehicle HMI (steering wheel buttons, voice.

The nomadic device will play an essential role as it will:

- Act as data collector and aggregator
- Implement and execute the main logics
- Manage the connectivity options available
- Implement and run all client applications needed

Other reasons to have the handheld device as the main player in the system are:

- Ease of implementation of applications on standard mobile OS;
- Handheld device lifecycle is much shorter than car lifecycle, thus making easier to have new and powerful hardware on handheld device than on car (obsolescence of on-board platform);

The vehicle will also be an active part of the planned services (mainly as source of information), but will be seen as a “black box”: it will be up to the handheld device to receive (process, if needed) and forward this information to the other actors involved. This will allow a clear separation between the vehicular environment, where carmakers need to protect their Intellectual Properties (IPs) and differentiate their products from competitors, and the rest of the ecosystem.

In addition to the IP protection of each carmaker, the OBU has to act as a “black box”, not opened to any kind of interaction, to avoid malevolent applications having free access to vehicle data.

Finally, this will enable the development, as well as enrich the offer of automotive-oriented mobility services based on Future Internet.

As for goods transport, in-vehicle system executes services needed for providing the driver with transport itineraries, navigation to locations, on-trip load balancing and eco-driving. The in-vehicle system connects to several server-side systems: e.g. the eco-drive portal used for sharing fuel consumption data between vehicles, drivers and haulers, or the transport planning system, i.e. existing hauler system used by the fleet operator to assign transportation tasks to the vehicles. The interfaces needed to integrate a Transport Planning System with the goods transport operator enablers are thus of interest to Instant Mobility, however it is not within the scope of the project to design a new Transport Planning System.

The Transport Exchange Portal will be a website with interface modules to share information with users, such as transport planners, transport bookers and systems; it will be deployed using cloud computing. The transport exchange portal provides a market where haulers and transport buyers buy and sell transports. It can also be used to increase the capacity utilization of vehicles.

The consignee is able to change the drop-off point of goods items, by sharing the calendar data with the hauler, either with the transport exchange portal, or with the transport planning system of the specific hauler that performs the transport. In both cases the same interface is used.

The V2V itinerary exchanger is the module that makes en-route dynamic load balancing possible by using the group message broadcast functionality provided by the mobile router (which ensures efficient and reliable transmission of Instant Mobility application data from the handheld device and/or the vehicle CAN bus to the infrastructure.

Traffic operators also receive information about the itineraries assigned to distribution vehicles, which allows them to optimize the traffic flows in order to increase the efficiency of city logistics operations. The provision of information is based on the vehicle OBU using mobile technology to interact with traffic control in the cloud.

By means of the Generic Enablers provided by FI-WARE, it will be possible to collect and analyse massive amounts of data from diverse sources, as well as to classify it, which the Traffic Control Centre will then use to manage and consume FI services for improving traffic management and the high-level actuation of traffic strategies.

Having high quality data measurements of traffic will allow algorithms to make high quality traffic forecasts. Such traffic forecasts will be available by means of open interfaces that will use the Service Delivery Framework which is planned to be developed in the FI-WARE project.

The intersection virtual controller will enable the system to implement virtual road side units. Different control strategies can be applied in different sub-areas according to local needs. The system is fully adaptive on traffic and applies dynamic optimisation concepts. The overall network optimisation is decomposed into co-ordinated junction problems solved by the virtual intersection units that are hosted in-the-cloud.

5.2.3 Architecture

The Instant Mobility system is best described by the following properties:

- **Data-centric:**
  Within the Instant Mobility system, a continuous stream of data and events, originating from various origins, has to be processed in an efficient and safe manner.
- **Real-time:**
  Data and events have to be processed in real-time as this is an important property for e.g. the navigation and routing applications, the traffic operator who needs to be immediately informed about critical traffic situations to undertake concrete compensation actions.
- **Distributed:**
  Not only processing nodes of the system are distributed over the network to create a robust and scalable system. In addition, the data producers (like road side units, floating cars) and the potential service consumers (like travellers) are distributed over the network. In this context, a number of different nomadic devices like in-vehicle systems or mobile phones are part of the system as well. They might act as both data producers and consumers. Thus, the Instant Mobility system can be considered as a “heavily” distributed mobile system.
- **Open**:

The Instant Mobility services have to be provided using open, common, widely-used standards to facilitate usage of the platform. In addition, this is required for efficient and easy integration with external systems.

- **Federated**:
  The provided functionalities of the different scenarios focus on metropolitan areas. This also needs to be reflected by the system architecture to be able to meet the real-time constraints. Particularly, this is required to achieve the geographically scalability of the system. The basic idea is to deploy a metropolitan-specific set of Instant Mobility services on a "metropolitan-near" located cloud infrastructure. Thus, it is ensured that data is efficiently processed next to its production.

Basically, the functionalities of the Instant Mobility ecosystem are offered by a RESTful (Representational State Transfer) Web Service interface layer. These services form the basis to build the scenario-specific applications of the different scenarios. For efficient distribution of data between data producers and data processing components, an efficient real-time enabled data distribution middleware is required. Moreover a complementary communication middleware system is also required that supports flexible, context-based publication of and subscription to data events. The major use case is to provide context-aware information to external systems. This approach results in a great flexibility when adaptations of the interaction patterns or the system architecture are required. Finally, to achieve an elastic scalability of the overall system, the components run on a cloud infrastructure.

The basic idea is to deploy the required Instant Mobility components on a cloud infrastructure which is located next to a metropolitan area. In particular, the different Instant Mobility clouds have to be able to communicate, for instance, to transparently hand-over a traveller`s itinerary in case of an inter-metropolitan journey. Another use case might be the quick dissemination of traffic events which have the potential to sustainably influence the traffic situation in another metropolitan area. These use cases could be addressed with the mean of inter-cloud communication which is still a recent research topic ([Amin2012][37], [Wu2011][38]).

Instant Mobility uses the SOA (Service-Orientation) design pattern as paradigm to define its architecture, i.e. the system is composed using loosely-coupled and interoperable services. In addition, SOA requires basing the services upon well-defined standards. While SOA is not a new concept, it particularly gained popularity by applying (SOAP-based) web services for its implementation. We perceive SOA as an evolution of distributed computing which is not restricted to a specific technology (e.g. Web Services, Common Object Request Broker Architecture (CORBA), or Distributed Component Object Model (DCOM)). SOA basically helps to design a system from the business point of view which exposes well-defined reusable services. These services form the basis of the Instant Mobility ecosystem and are used to implement the Instant Mobility end-user applications. In addition, the service layer can also be considered as integration point with external systems. Thus, it facilitates the technical re-use of the Instant Mobility functionalities by third-parties.

We decided to use RESTful Web Services as foundation for the Instant Mobility architecture and the respective service API because

[37] Amin2012: Muhammad Bilal Amin et al; Intercloud Message Exchange Middleware; ICUIMC'12; February 20–22, 2012; Kuala Lumpur, Malaysia

[38] Wu2011: Chi-Jen Wu et al; Time-Critical Event Dissemination in Geographically Distributed Clouds; IEEE Conference on Computer Communications Workshops, INFOCOM Wksps - INFOCOM WKSHPS , 2011

- scalability is one of the major design goals of REST;
- RESTful Web Services are more client-developer-friendly because a well-defined RESTful API is more intuitive and easier to consume;
- RESTful Web Services make clients more robust to API changes;
- the thin technology stack makes calling services easy from any device;
- the required HTTP stack is available on almost every platform and can be considered as "mature", thus the resulting system benefits from lower latency and improved system performance, and avoids potential vendor lock-ins;
- the approach to explicitly support different, situation-aware resource representations makes RESTful Web Services more interoperable within a heterogeneous environment

One of the fundamental challenges of the Instant Mobility project is the efficient processing of data and events in real-time which ordinate from a large number of data producers (e.g. changing traffic conditions have to be immediately propagated to the respective data processing and analysing components; then a potentially large number of affected travellers have to be notified about the expected changes to their itineraries).

Particularly, the system must ensure its performance level even when the number of participating clients increases significantly. Thus, for such a real-time data propagation task RESTful Web Services are not sufficient. I.e., a complementary real-time enabled communication middleware is required.

The publish-subscribe communication paradigm generally fits best to the Instant Mobility performance and scalability requirements. On this basis, we introduce the Data Distribution Standard (DDS)[39], which provides real-time, publish-subscribe capabilities and show its suitability for Instant Mobility. DDS fits best to the requirements of the Instant Mobility communication middleware. Competing middleware systems either do not offer the required abstraction level (e.g. missing data-orientation, middleware administration) or cannot achieve the required performance / scalability level.

Additionally, DDS is an actively maintained standard with various industrial proven and Open Source implementations [DDSVendors][40]. To avoid vendor lock-ins and to ensure the applications which have been developed with different DDS implementation, DDS Interoperability Wire Protocol has been specified.

In context of the cloud computing services provided by FI-WARE, Instant Mobility platform relies on the PaaS level, which enables the Instant Mobility system to dynamically add new computing nodes when required and forms the basis to fulfil its elastic scalability as well as reliable, long-term data storage requirements. Finally, we want to point out the services provided by Instant Mobility fit into the metaphor of a SaaS offering.

In addition, an extension of the proposed stack model by the introduction of a dedicated Algorithm as a Service (AaaS)[41] layer could be useful to address complicated simulation tasks. In

[39] Data Distribution Service (DDS) is a formal standard from the Object management Group (OMG) which addresses the needs of mission- and business-critical applications, such as, financial trading, air traffic control and management, defence, aerospace, smart grids, and complex supervisory, telemetry systems, and in general Big Data Applications. DDS specifies an API designed for enabling real-time data distribution. It uses a publish-subscribe communication model, and supports both messaging and data-object centric data models

[40] DDSVendors: http://portals.omg.org/dds/category/web-links/vendors; Access 25.06.2012

[41] AaaS: http://cloudnsci.fi/wiki/index.php?n=UserGuide.ConceptualDesign; Access: 21.03.2013

the AaaS model an algorithm is effectively a process which performs a sequence of data processing steps with the goal of increasing data value. Thus, the approach allows decomposing a complex simulation tasks into “algorithms” and re-using them in new, innovative ways.

Most available Web frameworks support the Model-View-Controller (MVC) pattern, which is a general pattern to design interactive user interfaces and is not specific to the Web application domain. For Instant Mobility, we suggest to follow a client-side MVC approach because it consequently carries on the principles of RESTful Web Service design for the implementation of Web applications.

To achieve a comprehensive solution which covers both architectural and economic aspects, the Unified Service Description Language (USDL) has been introduced. This platform-neutral service description language is about to be standardised by the W3C Incubator Group [W3C2011][42] which concentrates on specification and further development of USDL as an open standard.

The usage of USDL and the Applications and Services Ecosystem and Delivery Framework provided by FI-WARE are highly relevant for the dissemination of Instant Mobility services. Particularly, it allows the offering and advertisement of the Instant Mobility services to a broader community (e.g. other use case projects) and opens new not yet foreseen usage scenarios which could be implemented in ad-hoc manner.

Mobile devices are heavily used in Instant Mobility and have their specific challenges (e.g., connection is not guaranteed, limited resources, fragmented technology market). To spread functionality between mobile devices and the Instant Mobility services, the functional part in the mobile device will be based on the devices proprietary architecture and communicate via Web Services calls (e.g. SOAP or REST) with Instant Mobility services in a typical client server manner. Thus there will be a trade-off between the functionality that is kept on the server side and autonomous algorithms that are deployed to the nomadic device. This can be used to provide well thought out mechanisms (“fall-back”) in case a specific technical resource is temporary not available.

5.2.4 Future Internet capabilities

Instant Mobility has explored in some depth just how Future Internet could be an enabler for very different ways to organise mobility and to operate transport fleets and networks. The project has prepared a Future Internet Roadmap (D3.2) providing an overview of the main Information and Communication Technologies that could be useful for the Transport area.

During the last fifteen years 4 majors trends have strongly modified our environment without dlivering concrete innovation nor new services for travellers and citizens in the transport area. The maturity of these trends provides a strong innovative ecosystem to develop the new multimodal transport system for 2015 and prepare a green and sustainable Horizon 2020:

1. Mobile technologies

   The phone has evolved into a very personal accessory that allows to reach anyone, anywhere you are. Coupling Internet with wireless technologies reinforces the customization of communication channels and anyone can consume his own content through streaming, peer-to-peer or video-on-demand services.

2. Internet

[42] W3C2011: W3C Incubator Group; Unified Service Description Language XG Final Report; http://www.w3.org/2005/Incubator/usdl/XGR-usdl-20111027, Access: 27.06.2012.

If Internet is not really a technology but fully supported by IP, search engines and web crawlers, it has become one of the major tool for connectivity and sharing any kind of information. The improvement of graphics interfaces allows to submit any kind of content, from classical text to rich media as music or video. Dedicated services propose global environments to share your contents, social media, and every data becomes information.

3. New interfaces

   The Web 2.0 provides applications that facilitate participatory information sharing, interoperability, user-centered design and collaboration on the World Wide Web, but user-centered design is not fully completed as applications interfaces are not so standardized. Apple and Google with iOS and Android introduced new innovations with small applications available through stores.

4. Internet of Things

   A new version of the Internet Protocol (from IPv4 to IPv6) is necessary because every small things in our environment will tomorrow interact together and communicate with humans.

The following criteria have been identified that have an impact on services–and used as a basis for the functional requirements analysis–based on how these services are delivered today (if they exist) and what technological improvements are expected to launch a new ecosystem of services in a near future:

- Always-on connectivity
- Accuracy of data
- Computational resources
- NFC technologies
- Location-based services
- Sensors technologies

As travellers are often moving from indoor to outdoor, especially when using metro in large cities, seamless connectivity is required to emulate always-on connectivity. Lots of trials are ongoing for public wifi roaming including mesh technologies. We can expect that in the next three years, these technologies will be much more available in large cities and main multimodal areas as rail stations or airports and really provide seamless and always-on connectivity. These technologies could be also available in some open city areas but should not include seamless access to **4G** networks. In the next two years, with 4G networks deployment and native IP sessions for mobile devices, latency should decrease around 0,2 second (packet-switching) which is much more reasonable for trial.

Convergence is the biggest challenge in the area of Internet of Networks because Internet is synonymous of a common and single access to the information when each device manages its own technology to provide a physical access to the network. **IPv6** should provide common address system for all connected objects and build an abstraction layer upon all the physical networks. We expect a first convergence step with **LTE** and future 4G technologies despite the profusion of new protocols. 4G networks will use full packet-based infrastructures, relying on IPv6.

To support these evolutions, the main issues to solve are:

- Provide compatibility with previous technology

- Provide roaming between different technologies

New technologies as LTE and 4G will be able to provide precise location based on device localization in the network (identification of a mobile cell) and with no additional cost. Future Internet should provide roaming for localization services to assume that localization should be available independently of the selected operator. In the same time, smartphones host location services because GPS chipsets are embedded while Internet access supports up-to-date information as maps, traffic or Points of Interest.

In the Transport area, lots of types of data are available and real-time technologies will increase a lot the amount of data that transport stakeholders could exploit to improve services. Of course more and more resources will be needed to store, analyze, search and distribute these data, and **fixed networks** will continue to deliver ten times more bandwidth than mobile channels. Thus for fixed networks operators, bandwidth is the main advantage to innovate and include especially broadcast or multicast services, which are traditionally on-air services.

While **Content Distribution Networks** (CDN) introduce a new dimension to manage huge volumes of rich content and how to distribute them. Indeed CDN are systems of computers with storage environments containing copies of data, placed at various points in a network so as to maximize bandwidth for access to the data from customers throughout the network. As Future Internet will provide worldwide access to any content, customers would access a copy of the data closed to their network access, as opposed to all customers accessing the same central server, so as to avoid bottleneck near that server.

Fixed networks, which are dedicated to a limited set of devices, would also provide common access to Future Internet for all connected devices at home or in a business environment. This convergence will also be supported by new protocol adaptation layers and new **interfaces** for devices. Smart boxes would be the main network interface, bridging all wireless technologies with fixed networks, and integrating home and offices “in the cloud” to deliver computational resources “as a service”.

Cloud hosting and cloud computing will be a backbone technology in almost every service devised to be deployed in Instant Mobility scenarios. Traffic managers and fleet managers will benefit from cloud resources to manage:

- Access to all traffic data which is in the cloud;
- High computing capabilities to process huge amount of data from different sources and different supply actors who share information in the cloud;
- Powerful algorithms to optimize passengers’ and goods’ routes, but also traffic signaling.

Internet, based on cloud services, could host all these data in their respective format and new models and algorithms will be able to extract relevant information for transport area depending of the service objective. There is no common format for traffic data, fleet management data, location of vehicles or people, payment data and define an interoperable standard will take lots of time.

The recent market saturation of key mobile technologies such as GPS-enabled smartphones have created a fertile framework for **crowdsourcing**, a new trend for searching and retrieving information in the transport community. It will be feasible in the next five years to build and launch services based on people as sensors, especially using smartphones as smart devices, citizens will be part of the same social network of travellers but without strong security and privacy warranties. In the case of Transport and Mobility services, crowdsourcing will be supported by all transport resources: vehicles, drivers, travellers, road infrastructures especially using Internet of Things technologies based on sensors and actuators and all ICT technologies

required for connectivity. The future trials should demonstrate how applications managing local profiles could bring a first privacy firewall and services will be launched only following opt-in mechanisms. Trustworthy third-parties are required for trial to ensure security of data.

Mechanisms based on publish/subscribe approach will support this new model and each actor will be able to provide public data for traffic or environmental impact as well as part of potential multimodal service. Public data modalities should be defined during trials especially to evaluate business models impact. Repudiation services can also be supported by Future Internet, i.e. where citizens will be able to define how long the data they agree to provide will survive in the network before disappearing.

Anonymisation mechanisms are a more challenging issue because to manage this service close to the user, ICT technologies require computational resources which are not really available today. Some technologies are available to manage anonymous mechanisms in a central way but this approach required strong network security and certified third parties.

Internet has largely supported online **social networks**, which function like an online community of users sharing common interests in different subjects. While there are a number of social networking websites that focus on particular interests, there are few which are focusing on Transport and Mobility concerns. Some of them appear recently more through small applications on devices and to share a very specific need: traffic information, car-sharing, etc. No concrete community exists to share all transportation concerns and habits.

Social Networks are available today though they are not able to manage elementary business processes and access rights management tools are poor. New social networks tools will appear in the next five years that allow things to be put dynamically in ad-hoc networks and manage some operations processing. These machine-oriented social networks will be monitored through human social networks to deliver automatically expected services based on an Internet of Things environment.

Future Internet technologies should provide elementary features and composition tools where each user will be able to build its own environment. Based on Apps Store in the mobile world where consumers can download small applications, to connect some of them to have your custom software depending of your personal context including nomadic access is the next challenge for XaaS technologies.(XaaS refers to all types of resources which could be provided “As A Service”, not hosted or owned directly by the end-customer.)

Mashups tools are generally customers applications which could be hosted online (SaaS) to use and combines data, presentation or functionality from several sources to create new services.

Future Internet will provide an extensive environment of what is only content aggregation proposing elementary features to build dedicated customers applications.

Future Internet will decrease the level of complexity of API (Application Programming Interfaces) and enhance new Human-Machine interfaces (HMI). This new HMI, which could be associated with Apps store mechanisms, will allow end-users with any programming knowledge to build its own software. Each consumer can download its apps to enrich his environment but future interfaces have to provide user-friendly composition of applications to fulfill every need of the end-user and to reach the best of Web 2.0.

5.2.5 Conceptual prototypes

Instant Mobility integrated the enabler specifications to define and implement software conceptual prototypes for demonstrating the feasibility both of the underlying Future Internet technologies and the applicability of those technologies in the domain of transport and mobility.

The domain-specific enablers needed to demonstrate the Instant Mobility approach and feasibility have been selected. By prioritizing the most critical and innovative aspects and functions of the Instant mobility, the prototypes reflect a subset of the specifications that were necessary to validate.

A virtual prototype was demonstrated for each of the three use case Scenarios to verify the specified concepts and technologies as well as to provide a demonstrator for WP7.

These prototypes are now available for reuse by the new Phase II projects or in FI-PPP Phase III[43]. On the other hand, it may be used by a city willing to be considered as experimental infrastructure to assess its suitability or required investment to reach the necessary state. There will be a repository of all related information on IM website, for as long as it is maintained and CONCORD also plans to compile such repository for the whole programme.

5.2.5.1 Prototype 1

Instant Mobility Scenario 1 prototype simulates in a realistic way, the urban and suburban trips in a city, based on the population's movement statistics. The city map displays the live positions of buses, travellers and cars and the journey details of each traveller could be obtained in real time. A statistics panel provides key figures of the simulation. The demonstration shows also the dialog between a traveller and a car driver involved in a common ride.

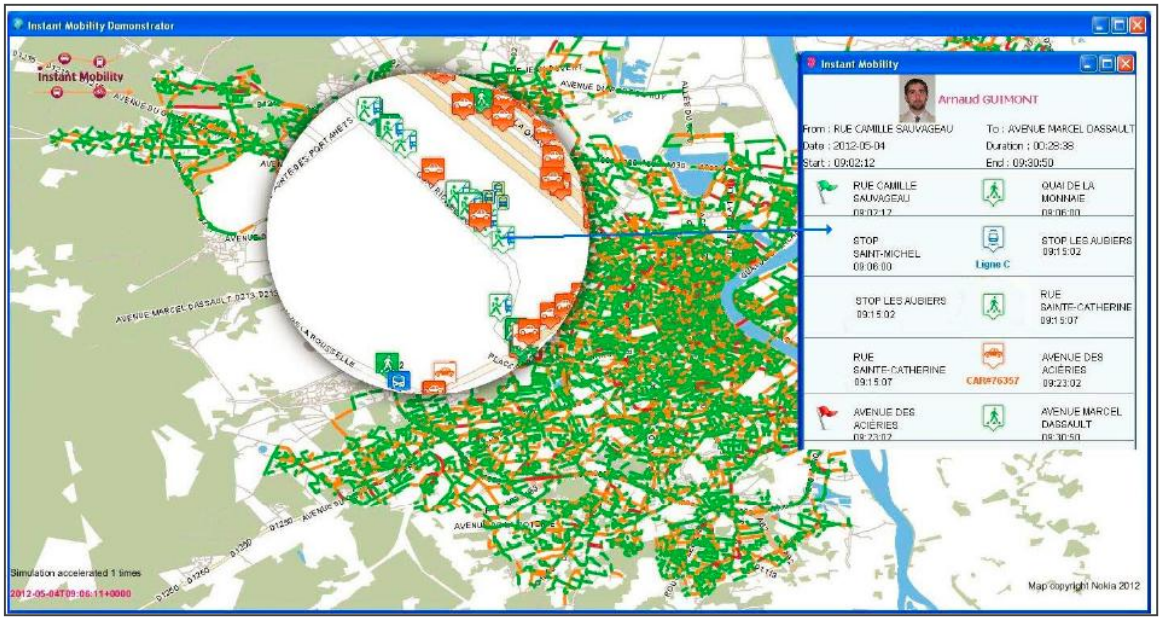


Figure 23: Scenario 1 prototype – Operator GUI

[43] The Instant Mobility website will constitute a repository for the project conceptual prototypes (another one will be CONCORD website, which aims to collect and make available all results from Phase I UA projects).

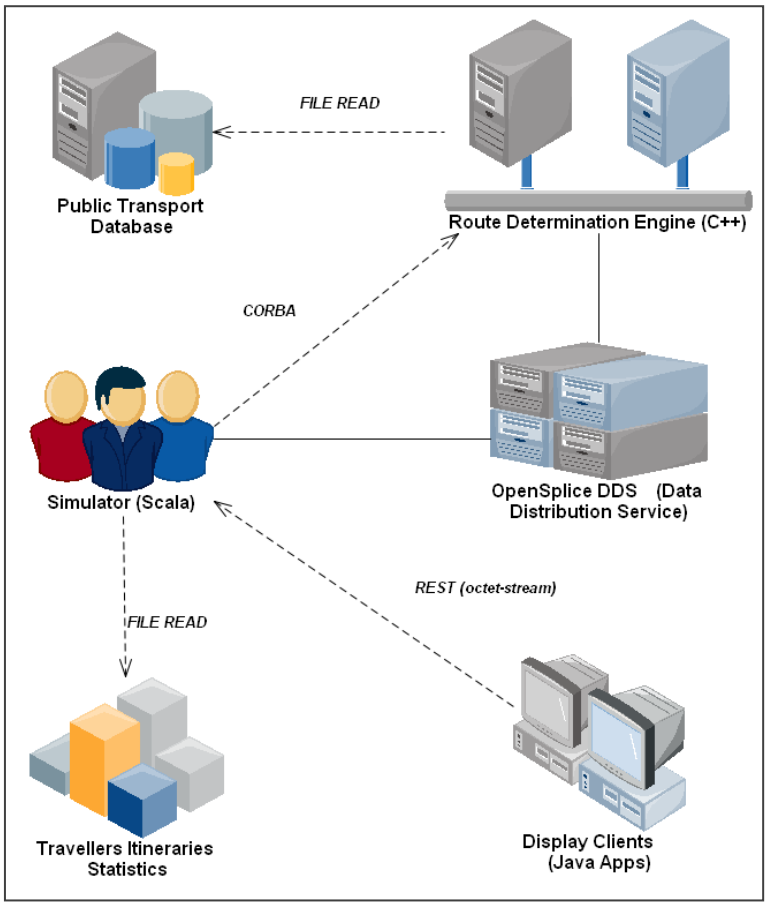


Figure 24: Scenario 1 prototype components and nodes

The prototype does not require specific hardware environment. Overall, the purpose of the prototype is to be a fair simulation of the local reality.

- The prototype use data from effective origin-destination travels from home to work and home to school;
- The simulation currently use 450 K travel per days (departures only), i.e. 10% of effective journeys in the urban area;
- The density of cars and buses reflect the reality;
- The journey density along the day is preserved

All communications to the simulator are REST based: JSON for the mobiles (javascript) and octet-stream for the main situation display. Space based architecture is used for achieving linear scalability (application can scale up with the number of users/travellers by adding more processing units. This type of scalability is supported by the OpenSplice DDS middleware (a key enabler for us). All the potential points of contentions are identified and removed through data distribution, aggregation and filtering (e.g. situation displays).

One of the main discoveries when looking at the statistical data generated when running the simulation is that by allowing common-ride we improve the travel time by at least 5 min for at least 1/3 of the travellers (it is assumed that only 10 % of the drivers are willing to use the system and pick-up travellers).

5.2.5.2 Prototype 2

A purpose specific to the "dynamic drop point" application, on which this prototype is focused, is to increase the convenience for the consignee, by offering flexibility in choosing a suitable time and location for dropping off goods, in order to avoid unnecessary transports, both by the transporter, who can avoid trying to deliver goods to someone who is not at home, but also by the consignee, who can avoid make an additional trip in order to pick up goods.

The pre-condition of the smart city logistics prototype is that a transport need has been detected and transport resources has been registered in the system; that is, a set of transport bookings has been submitted to the transport exchange portal via the web service interface. Based on available transport resources and submitted transport bookings; itineraries are planned by the system.

By using the Consignee App, the goods receiver can select calendar events to upload, which are then used by the system as input when planning itineraries. Using the vehicle simulation web application, itineraries can be downloaded to a simulated vehicle, which executes them on a map and report back to the transport exchange portal.

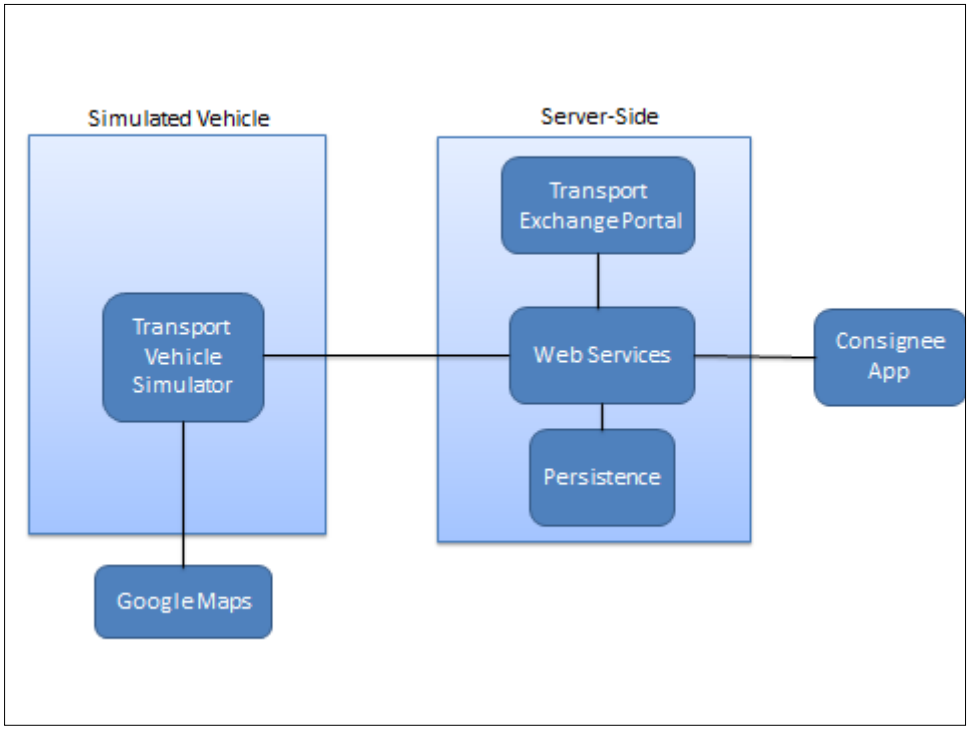


Figure 25: Smart City Logistics prototype architecture

The Smart City Logistics prototype consists of three main nodes; the vehicle, the server-side and the consignee's mobile device. The main components of the server side are the web services, which implement the vehicle transport management interface, the transport resource manager and the consignee API. There are several clients to these web services; the itinerary processor develops itineraries based on the transport need and available resources, the transport exchange portal provides an overview of the transport bookings and itineraries, the consignee app provides the dynamic drop point service to the end user and the simulated vehicle executes the itineraries.

The simulated vehicle is a client to the vehicle transport management interface. It is implemented as a Google Web Toolkit application running inside a web browser, which lets the user select a vehicle itinerary and follow the execution of the itinerary on a map.

The demonstrator in Barcelona MWC used a single computer, which executed both the server side of the system; the database, the web services and the transport exchange portal. This computer

was connected to Internet via its Ethernet interface, for access to Google Maps and to a WLAN access point, in order to be accessible by WLAN from the smartphone on a static IP address. This implementation was chosen to avoid being dependant on wireless Internet connections available at the congress, which may not have been stable enough to perform the demonstrations.

Another setup, more close to a real deployment, was also used. This setup used a cloud computing infrastructure provided by DLR, together with a 3G connected smartphone.

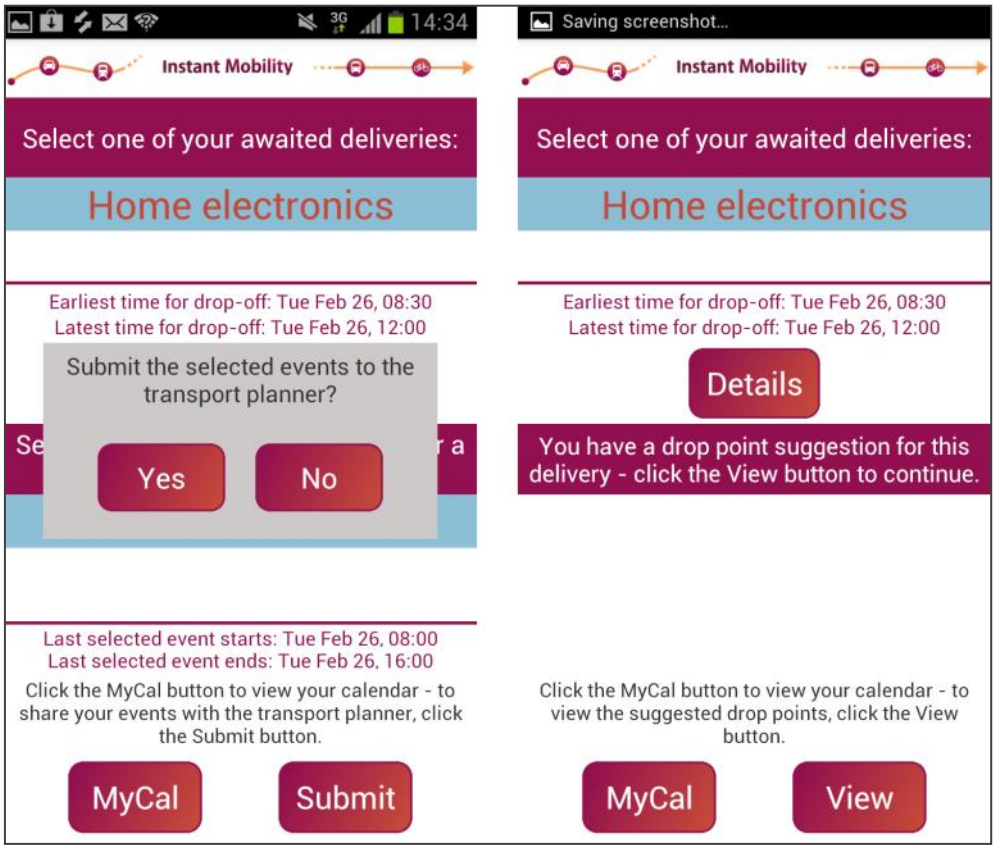


Figure 26: Consignee API

5.2.5.3 Prototype 3

The conceptual prototype of Scenario 3 represented by different V-RSU is configured and interfaced with TSS Aimsun[44], a traffic microscopic simulator.

The prototype is based on 10 V-RSUs (one for each intersection) installed in corresponding cloud VMs (virtual machines). Since it is not possible to run tests on real roads, these have been substituted by a traffic simulator, based on a microscopic approach to accurately represent the traffic conditions in the network.

In the simulation model, the vehicles are generated and shipped through the network. Each vehicle is treated as an autonomous entity and the interaction of the vehicles is allowed vary depending on stochastic (randomized) parameters. These parameters are intended to represent individual preferences and tendencies. The area of the city involved in the prototype will be comparable with a larger quarter of the city, and 10 intersections are included in the simulator.

[44] http://www.aimsun.com/wp/

When a vehicle is passing a detector message is generated towards the adaptive signalling which is treating the incoming traffic information to set-up the best signal setting according to the present traffic situation. The chosen strategy is shifted back towards the simulation model which is changing its signal according to the adaptive strategy.

It is important to underline that the abovementioned detectors have been used as they represent the most consolidated way to realise communications between traffic simulators and external controllers. According to the vision proposed by other "Transport Infrastructure as a Service" Scenario applications, these detectors can be replaced from many other kinds of data coming either from the infrastructure or from mobile devices, cooperative vehicles, external providers and so on.

The communication between the simulator and the cloud V-RSUs is made using sockets (TCP/IP). The simulator module in charge of this is the SimProxy, a module that deals the communication between V-RSUs and the simulator models (implemented in the microsimulator kernel).

In first approximation, a VM is needed for each of the traffic control zones the city is divided. In the case of this demonstration, only one zone is involved (zone 6). Another VM has been created for the traffic simulator and virtually represents the road of the city of Trondheim. All these VMs are based on MS Windows Server 2008[45]. For the purpose of the demonstration, all the VMs have been accessed by remote desktop. Web-based GUI is available as well.

Besides the demonstration purpose, some tests have been performed with a simulator that is virtually located in the city of Trondheim (Norway) and is based on a micro approach. Virtual road side units control all the intersections of the model, giving the services listed in previous sections and using real on-field data coming from traditional road sensors and innovative sources and potentially data providers. The area of the city that has been selected for the demonstration is the main corridor crossing the southern part of the city from the motorway to the city centre. This corridor experiences some congestion during the morning that at present are managed with a traditional road-side system. This will allow to evaluate the cloud-based system proposed by Instant Mobility and to compare its performances with the ones of the traditional road-side system.

The aim of the simulation was to test and evaluate if SPOT/UTOPIA located in a virtual environment "Traffic control in the cloud" is able to give enhanced traffic-adaptive control services like fully adaptive signalling, green waves management, and priority to public transport. This prototype represents the first step towards a more efficient utilisation of adaptive signalling looking at cost efficient solutions for installing the UTC in new areas within the cities.

For the testing purpose, 10 signalized junctions and pedestrian crossing with adaptive traffic signal control in the centre part of the city were considered. The effects are primarily calculated based on quantitative analysis with simulations in TSS Aimsun. An important prerequisite for comparing different control strategies is to have a controlled traffic.

[45] http://www.microsoft.com/it-it/server-cloud/windows-server/default.aspx

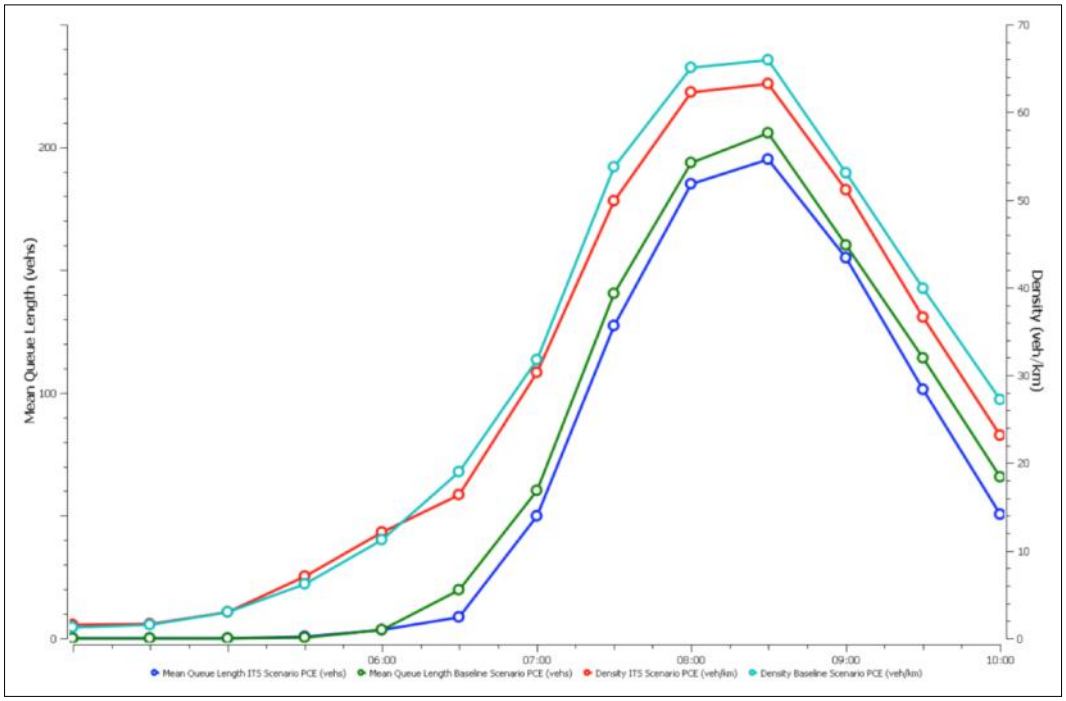


Figure 27: V-RSU assessment – Average queue length and vehicle density

Looking at the four time series, it is possible to see the improvements (comprised between 5% and 10%) both for the mean length of the queue, which is one of the main parameters used to measure drivers' discomfort while travelling, and for the average density, which is one of the most direct measurement of the quality of traffic flow and of, in first approximation, fuel consumptions and CO_2 emissions. Such improvements are more evident in the peak of the traffic demand, around 8am, and in the discharging part of the graph, where the adaptive signalling operated by the virtual RSU is much more efficient in draining vehicles.

5.2.6 Domain-specific enablers

These together specify the “Instant Mobility Platform”. Some are specific to one of the use case Scenarios, others are common to the three Scenarios.

5.2.6.1 Scenario 1

There is only one direct enabler for the Personal Travel Companion Web-Portal: the web server hosting the application. It should be noted that this web application takes care of the human interaction with the retailer web server. It is envisioned that the same retailer services could be used by this web application and the mobile one (e.g. “Plan Future Journey” and “Plan Immediate Journey”). This web application can be deployed on any computer including the traveller’s home computer or more likely the retailer server.

The Personal Travel Companion Application can be deployed on any handset device. The same HMI maybe mirrored on the OBU display. The HMI has to be developed using HTML5 and interfaces to device resources should be available through javascript functions.

Regarding payment, Instant Mobility assumes that within a few years, NFC proximity radio interface will be quite popular on mobile terminals, independently from any market segment. Virtual tickets shall be stored in the traveller’s mobile terminal (not necessarily in the SIM, they may be stored in the application memory as well). The “Proximity Interface” shall respond to

external NFC interfaces from transport operators' infrastructure or terminals and send the required virtual ticket data.

The local monitoring module is responsible for monitoring the trip of the traveller. It maintains continuously a listener on the itineraries and on the traveller's current positions and preferences. If the current position of the traveller deviates from the planned position more that what is tolerated in the traveller's profile, the monitoring module alerts the traveller and a new itinerary can be proposed to the traveller.

Specific software enablers for the deployment of the Personal Travel Companion Application but that, in our opinion, are eligible as Future Internet generic enablers because they can be re-used in other usage areas, include:

- Data Synchronization Module responsible for synchronizing the information on the local device with the user information stored on the cloud. This module use FI-WARE CDI Personal Data to store data locally. On the other hand it is connected to FI-WARE Traveller profile to store the data remotely.
- Traveller profile module responsible for storing remotely all needed information related to traveller, from profile to preferences and so on. This module may use the Data/Context manager enabler provided by FI-WARE
- Proximity Interface and Secure Element API responsible to allow the application layer to fully exploit the capabilities of proximity interface of the mobile terminal, if available.

  The physical interface must be NFC that is the contactless interface that allows the phone to interact with RFID technologies.

  The APIs to use the NFC transceiver and to access the secure element to configure it are defined by the GSMA standard. We recommend to use this approach and to map all these functionalities in the overall framework for mobile terminal development that is designed by FI-WARE I2ND-CDI.

  Also we recommend that, as suggested by the GSMA, the secure element is implemented inside the SIM. In our perspectives APIs to access NFC transceiver should be exposed by FI-WARE Proximity interface while Secure Element APIs have their own component.

  This enabler may be used for Ride Sharing applications to mutually authenticate driver and passenger, eventually using the OBU. For this reason we envisage an authentication component on the OBU connected to a NFC interface. This authentication component may be used by an application on the OBU using APIs similar to those exposed by FI-WARE Proximity and Secure Element APIs.

5.2.6.2 Scenario 2

The main components of the server side are the web services, which implement the vehicle transport management interface, the transport resource manager and the consignee API.

The Consignee App is a smartphone app, developed for Android 4.0.x, which is used by the consignee to share data about his/her whereabouts in order to agree with the transport planner about a convenient time and location to receive goods. It first fetches transport booking information for which the consignee expects the delivery. The consignee then selects the calendar events for which he/she is able to receive the goods. These calendar events are then uploaded to

the transport exchange portal. When the calendar events have been processed, a suggestion for a drop point is presented to the consignee, who is then able to accept or reject it.

The following enablers are server-side systems or components typically deployed in the back-office or in the cloud:

- The transport management in-vehicle service provides the driver with transport itineraries that originates from transport missions from the haulier, the transport exchange portal or a combination of both. The service also enables dynamic en-route load balancing and optimization by exchanging information about itineraries, capacity utilization and arrival time deviations to other vehicles equipped with the same service.
- The transport Exchange Portal developed for the prototype consist of a web portal for monitoring incoming transport bookings and transport missions, which are updated in real time as they are being processed by the transport resources. The transport exchange portal also consists of a number of other enablers, which implement the web service interface that the vehicle and consignee applications use to interact with the system.

  The transport exchange portal provides several integration interfaces: business-to-business (B2B) interfaces to integrate with transport booking systems and in-vehicle systems for fleet management; business-to-consumer (B2C) interface that can be used to develop applications which allow selection of dynamic drop-points.

  Another factor that contributes to increasing the integratability is that the interfaces towards the in-vehicle clients are published and built on open standardized technology such as RESTful web services. This means that any vendor can build in-vehicle systems that work with the back-end services, the transport exchange portal and the eco-drive portal (see hereunder).
- The vehicle Transport Management Interface is a RESTful web service interface, implemented as a JAX-RS web service, which contains functions for retrieving transport itineraries, reporting status on a transport mission, current position, etc.
- The transport Resource Manager is a RESTful web service interface, implemented as a JAX-RS web service, which contains functions for creating, retrieving and deleting transport resources and for authenticating the transport manager.
- The consignee API is a RESTful web service interface, implemented as a JAX-RS web service, which typical client is a smartphone application containing functions for authenticating the consignee, for sharing calendar data, receiving and accepting goods drop point proposals.
- The itinerary Processor creates transport itineraries based on the transport bookings and the transport requests in the system. It continuously iterates through the transport bookings and tries to match these with the transport resources available and the calendar data uploaded by the consignee. When a transport booking has been matched with an itinerary, an itinerary proposal is constructed. When the itinerary proposal has been accepted by the consignee and the transport planner, the itinerary is assigned to a transport resource.

  The Itinerary Processor has two service interfaces, one for receiving notifications that data, such as transport bookings and transport resources, has changed and one for dealing with itinerary proposals.

The eco-drive portal makes it possible for different hauliers to compare the eco-drive performance of their drivers and vehicles with each other. It is built using a three-tier architecture typical for

web applications. The web frontend implements the web-based user interface that drivers and fleet managers use for viewing the eco-drive data. The Eco-Drive Vehicle Interface module implements an API that is used for both uploading and downloading of eco-drive data. This API is used by the in-vehicle systems to feed the eco-drive portal with data and also to provide the driver with feedback, by comparing the drivers' eco-drive performance with other drivers.

5.2.6.3 Scenario 3

The Traffic management centre hosts the data collection and algorithmic processes and consists of four main components, designed for multi-source data collection and processing and information broadcasting:

- Data Gateway, aimed at the collection and aggregation of data related to traffic coming from different sources, including FI-WARE integrated Sub-systems, other Instant Mobility Applications, external data providers, and existing legacy systems (e.g. for urban traffic monitoring);
- Wide-area Supervisor, which is in charge of the multi-layer optimisation of the network both at strategic and at tactical level, in close cooperation with the Intersection virtual Controller. Its aim is to provide as an outcome analysed data (coming from the Data Gateway), in addition to the policies resulting from advanced algorithms and strategies of traffic management;

  In particular, this component will enable to:

  - validate data, comparing information from different sources
  - geolocate data on the reference cartography
  - estimate the current traffic flow over the network
  - make high-precision traffic forecasts
  - automatically generate and manage traffic events, and send alerts to traffic operators and platform managers
  - manage traditional (e.g. VMS) and innovative on-street and off-street information devices (e.g. cooperative systems communication)
- Intersections Virtual Controller, which is in charge of creating the traffic signalling plans by computing the aggregated traffic information received from the abovementioned components and systems. This component will enable the system to implement virtual road side units (RSUs), hosted in the cloud, in comfortable server farms. Different control strategies can be applied according to local needs, availability of traffic measures and design options. Mainly, the system is fully adaptive on traffic and applies dynamic optimisation concepts. The overall network optimisation is decomposed into co-ordinated junction problems solved by the virtual intersection units. The units are hosted in-the-cloud by means of FI-WARE PaaS Management GE, so they can easily and efficiently interact continuously to evaluate the effects of the planned control actions on the downstream intersections. Each unit looks-ahead in the optimisation horizon in order to compute its own control strategy in accordance with the upstream intersections. This represents the evolution of the traffic control application exploiting the networking capability made available by the FI-WARE Core Platform such as access to a pool of

configurable resources that can be rapidly released with minimal management effort or service provider interaction;

- Mobility Management Dashboard, aimed at the presentation and communication of data processed by the system. Into other words, this component works as the interface between the system and the end-user (typically the traffic operator) to monitor, configure and control all the functionalities of the complex abovementioned systems, including their integration with the FI-WARE Core Platform and the performances of the subsystems. It is a road information in-the-cloud component for easy access via Internet to road information available in the traffic management centre.

5.2.6.4 Common to all scenarios

In general most of the enablers here described have a relation with FI-WARE Interface To The Network – Connected Device Interface (I2ND–CDI), and could expand its specification. There have been some contacts with FI-WARE in order to understand and integrate I2ND-CDI with IM enablers. Generally speaking this would imply that the mobile applications will be developed through HTML/Javascript, and all enablers must be accessible through this programming paradigm. All cloud services must be accessible through REST interfaces.

Mobile Real-Time Location" enabler is responsible for gathering and integrating all available sources of positioning data, processing them and providing the best estimation of latitude, longitude, altitude, speed and orientation of the mobile terminal, together with their accuracy. the Navigation module relies on the Mobile Real-Time Location to get the position.

Instant Mobility gateways are essential to ensure the integration of all the IM Applications and Services in an unique and cooperating ecosystem. The challenge here is related to definition of communication protocols and standards and the realisation of the required interfacing components. These gateways will be implemented by using REST specialised web services.

The main added value that the handheld device brings onto the vehicle is the internet connectivity, which will allow the connection of the in-vehicle system to a large set of cloud services, both for data collection, for communication of the vehicle data to the service centre and for the reception of traffic data. Most probably for this purpose a long range connection is needed, but the nomadic device could also exploit WiFi spots. For the physical realization of the communication channel, it is desirable to use 4G (LTE?) technology, since it provides a very fast internet connection through the mobile phone network.

The mobile router module ensures efficient and reliable transmission of Instant Mobility application data from the handheld device (check-in, check-out, geo-location, etc.) and/or the vehicle (sensing output) to the Instant Mobility infrastructure. The mobile router function ensures that Instant Mobility data can rely on the right and best set of in-vehicle interfaces to enable communications resilience and to meet bandwidth requirement. Furthermore, the module handles the Internet Protocol (IP) coexistence (IPv4 and IPv6) between the vehicle and the infrastructure as well as seamless session handover from one interface to another.

6. Exploitation plans per partner

There is a general willingness of all stakeholders in Future Internet Transportation and Mobility usage area to exploit this promising FI technology. But there is also the fact that exploitation of this technology requires substantial investments that need to be justified by an adequate return.

Depending on the stakeholder, this return on investment can be monetary in terms of a permanent revenue stream that pays back for the investment on the longer run or non monetary. Examples of non-monetary benefits are reduction of CO_2 emissions, better use of the existing street network or being recognised as an innovative company or urban area.

Considering the impact on European society and the market potential, it is important for European Transport and ICT industries to take the leadership in Future Internet Technologies applied for Transport and Mobility services. Instant Mobility will have an important impact in increasing the technical leadership of the participating partners as well as the Transport and Mobility community, driving the roadmaps and standards for Future Internet services in that domain.

Partners' individual intentions are detailed below, demonstrating their strong engagement to exploit the project results to support their own business or activities.

6.1.1 ATAC SPA

ATAC SpA is a company fully owned by the Municipality of Rome (Italy) that manages both surface and underground public transport services of the city: bus, tramway and trolleybus, metro and two regional railway lines. In addition, ATAC manages on-street metered parking lots (for over 73.000 cars with more than 2.500 parking meters) and 30 Park and Ride areas near the terminals of extra-urban or regional lines or near underground or local railway stations, as well as some special services (school buses, tourist lines and vehicles for disabled people).

For these reasons, for ATAC the Instant Mobility project represented the opportunity to analyse the actual needs and requirements of its passengers and to use new solutions based on Future Internet technologies that can be applied to the world of public transport and more in general to urban mobility.

The results of Instant Mobility, and - in the future - of the projects of the next FI-PPP Programme phases, could be used to explore new technologies and services providing information to the citizens about the transportation modes that could become a real alternative to private transport. Indeed the possibility to have real time, complete, comprehensive and integrated information about transport and urban mobility, could encourage the citizens to use public transport instead of their own car, making their life easier, with the consequent reduction of the road traffic congestion and pollution.

Finally, the participation to the project also offered ATAC the opportunity to create networks with various important stakeholders in the fields of Future Internet, Intelligent Transport Systems and with other European cities/end users.

6.1.2 CEA

CEA is a well known research centre for its high quality research activities in the field of Information Technology. As a Research and Technology Organisation (RTO), one important mission of CEA is to help European companies to increase their competitiveness by developing innovative technologies and transferring these CEA technologies and know-how to industrial partners.

In the Instant Mobility project, CEA will define, develop, and validate open specifications of Future Internet mobile networking enablers for supporting smart vehicular communications and smooth

integration between vehicular on-board units and surrounding nomadic devices (i.e. smartphones).

CEA plans to integrate the results of its contribution to the Instant Mobility project in its mobile networking technology and software suite specifically targeted to vehicular networking, and to exploit these results through new technology transfer partnership with industrial partners. In that respect, CEA will build on its collaborations with car manufacturers, automotive tier-one companies, as well as public transport operators to assist them in experimenting new technologies and developing new products (around the connected vehicle) for enabling sustainable and multimodal mobility matching the Instant Mobility vision. CEA also expects to experiment its technologies coming from the Instant Mobility project in future collaborative mid-scale trials to take place in the Paris-Saclay Campus (including CEA campus) like the envisioned "Mobilité 2015" initiative. Finally, CEA also plans to exploit its results from the project by influencing standardisation (and in particular the IETF) when applicable. The knowledge gained from the project will also be used to identify new research challenges for the future research activities.

6.1.3 CRF

The so-called "cooperative mobility communication network" (as demonstrated at the Cooperative Mobility Showcase 2010 by CRF and by several other European companies) is planned to be implemented to enable applications to prevent road accidents for all road users, cars, trucks, motorbikes, pedestrians, cyclists and to improve traffic efficiency, with a consequent reduction of CO_2 emissions. The overall idea is that the mobility network should be created:

- Instantaneously, between two vehicles in case of imminent risks of accidents;
- locally, among vehicles and road infrastructures whenever any kind of traffic related problem is created and can be solved locally thanks to the exchange of information;
- at geo-referenced network level where all traffic control centres will know in real time how to best "inform" and "distribute" the traffic flow & provide traffic related information.

Therefore a common European architecture for the mobility network should include at least:

- time critical safety information that needs to be exchanged in real time and with the highest priority and should use a dedicated communication channel (the IEEE.802.11p wireless technology, as defined by the Car to Car Communication Consortium);
- safety and traffic efficiency information that can make best use of different communication bearers.

The mobility network, as developed by cooperative systems, is already foreseeing the access to a number of communication channels among which internet (IPV6).

Additional customised services for the users should also be made available to enable a sustainable deployment. It is for this reason that this project outcomes (e.g. Multimodal journey optimisation, navigation experience via continuous connectivity, etc) summarised in the "Instant Mobility implementation plan" will allow CRF to foster the integration of the automotive domain with the Future Internet world, thus accessing a potentially larger market in terms of numbers of Service/Infrastructure Providers, SW developers, etc, but also new ones, mainly in terms of SW applications (e.g. app stores), and will enable the development of new mobility applications.

Future vehicles shall be enabled to offer the users (drive and passengers) a number of services that will also be based on "cloud and distributed" paradigm. For all these reasons the Instant Mobility project represents a key point to analyse the needs and requirements and to fit them into

existing reality. It will moreover contribute together with communication and localization technologies to make the cooperative mobility network become a reality.

6.1.4 DHL

As a global player in logistics, DHL makes every effort to prepare its business and customers for the challenges of the future.

With challenges being as complex as they are, Instant Mobility project is an innovation project to develop M2M networking in the Future Internet framework. It is a chance to achieve logistics challenges for sustainable logistics industry in the next years:

- Climate – "Green" the Central Challenge: Companies collaborate with each other in order to develop intelligent and instant logistics solutions to improve route planning and execution and to reduce city traffic and CO_2 emissions. The logistics industry will become a trendsetter and establish new standards for cooperative efforts and "green" business.
- Technological Developments – Radical Changes in the Industry: The development and spread of the "Internet of Things" will bring wide-reaching changes. Every product will be networked with the Web, making it easy for consumers to get information about products and track them from production to delivery. New standards for supply chain management and transparency will be implemented. The Internet will transform customer expectations and behaviour all over the world – the focus will be on individualization, transparency, availability, and speed.
- Flexibility in transport - Internet commerce. The transport of numerous individualized products will create new challenges. Logistical systems will have to adjust for new markets and products in ever shorter time frames. Logistics companies will need to find answers to the increase of transit and transport streams in new and growing areas with high population densities. Flexibility, simplicity, and individualization will be required.

For all mentioned challenges, Instant Mobility project represents an opportunity to develop and test solutions for the future years. We plan two complementary exploitation strategies:

- Internal: It will be used to improve logistics solutions for real time M2M in a FI environment.
- External: It will aim at guaranteeing exploitation with third-parties. New standards and collaboration will be progressively extended to targets sectors (Consumer Goods, Retail, Pharmaceutical, Automotive, etc.). Special focus will be put on home delivery and SME community.

6.1.5 DLR

DLR has strong expertise in developing co-operative driver assistant systems and in setting up large scale testing facilities in this domain. The work of the Instant Mobility project will help to establish expertise in the co-operative applications that rely heavily on future internet technologies. The methodology, technology and architecture well-proven in this project will help to extent and sustain expertise and capabilities of DLR in this domain. This knowledge will be the foundation for further research activities on national and European-wide level.

In this project the core challenge will be the introduction of Future Internet technologies to the transport and mobility domain. DLR is applying some of these paradigms to its current developments but there are open gaps between a full integration and the code of practice today.

Instant Mobility will bridge promising technologies into the domain. This project will not only be beneficial for DLR but OEMs will also profit from new technological opportunities and will open new markets with this leap ahead.

DLR has three aspects of interest that are covered by the Instant Mobility project:

- DLR is convinced that the definition of a clear architecture is a cornerstone in the design of ITS applications. Instant Mobility will extend the existing expertise in the field to innovative technologies.
- Future assistant systems will rely on highly dynamic heterogeneous information sources such as social networks. Instant Mobility will integrate this information in a travel related context and prove its relevance. Other use-cases such as electro mobility can also benefit.
- DLR already has expertise in conducting large scale trails. The planning of the Instant Mobility FOT will not only apply this expertise to the project but also extent the knowledge and experience of DLR.

6.1.6 ERTICO – ITS EUROPE

ERTICO will promote the results of Instant Mobility within its membership, to the wider ITS community and to the general public in order to create awareness that should lead eventually to new product & service development, and then to deployment of these advanced ITS services.

ERTICO is a European partnership with 100 shareholders from public and private sectors, covering all key groups of stakeholders in the area of intelligent transport systems and services, and in most areas comprising a critical mass in that sector. A wide range of ITS technologies, products and services are already available, there is still however relatively little deployment. Some key standards are in preparation, while many existing telematics services are proprietary and linked to a single technology. For ERTICO and its Partners, Instant Mobility offered a valuable opportunity to explore the outer edges of the state of the art in this domain, with the aim of breaking down barriers to wider deployment through applied Internet technologies.

ERTICO is committed to widespread deployment and to the use of open platforms – i.e. a harmonized platform in the vehicle that incorporates future-proof technology and can support numerous services from different providers and with pan-European coverage. For example, in the MOBiNET project, to develop a Europe-wide platform for ITS services, ERTICO is exploiting and building on knowledge and experience acquired in Instant Mobility and the FI-PPP programme. In particular, MOBiNET is evaluating the feasibility and advantages of using FI-WARE components as enablers for the Europe-wide service platform, thus avoiding unnecessarily duplicating existing developments.

ERTICO has invested in Instant Mobility with the hope that the more data and services are available via the Internet, the more transport and mobility information will be available, the greater the choice of travel options and the more efficient and safe will be the operation of road and transport networks. In contributing to the Instant Mobility implementation plan for Phase 2, ERTICO has brought in a number of very innovative concepts for future Internet-enabled services and applications, in fields such as multimodality, traffic management, logistics and goods transport and traveller assistance. These ideas were explored in the frame of the Phase 2 call for proposals by a group of leading companies in the fields of transport and mobility services and future Internet technologies.

Indeed, we are convinced that the Internet – enhanced with features such as cloud computing, social networking, data warehousing and analysis, web services etc. – will be essential for the next

stage of ITS growth and implementation. ERTICO intends to use and re-use the results of Instant Mobility by promoting the new future Internet technologies towards its membership and seeking opportunities – such as through future R&D calls or through self-funded activities – to explore and to pilot some of the new mobility services in testbeds that could be provided by ERTICO Partners. (These include major European players in ITS services such as BMW, Volvo, TomTom, IBM, CGI, Atos, Orange, Deutsche Telekom, Telecom Italia, Ericsson, etc).

ERTICO will also promote the take-up of the Instant Mobility results in future large-scale actions such as the Smart Cities and Communities EIP (European Innovation Partnership) or the MOBiNET Europe-Wide Service Platform. As manager of TISA (Traveller Information Services Association) ERTICO will also advance the project's results concerning Future Internet as additional medium that could also deliver rich traveller information in addition to traditional broadcast means.

The contact with Instant Mobility city partners will be pursued after the project's end with a view of creating some "smart ITS city" showcases as a proving ground and demonstration of these and other innovative mobility services. Rome and Trondheim have already been included in recent proposed activities coordinated or supported by ERTICO.

As organiser of European ITS congresses, including the triennial World Congress with over 5000 key professional delegates, ERTICO will promote the themes explored in this project as congress programme topics, or as themes for the exhibition and accompanying showcases.

ERTICO has a Public Authorities Platform that has been meeting for over 10 years, where its more than 25 public sector partners come together. Since 2010 ERTICO has begun to organise other sector platforms for its Partners, including so far Mobile Network Operators, Traffic and Transport Industry, Service Providers, Automotive Manufacturers and Research Institutes. Each of these groups has a special interest in the potential of the Future Internet for their own sector's involvement in ITS (intelligent transport systems and services). On behalf of Instant Mobility, ERTICO is bringing the Instant Mobility results to each of these sector platforms, as appropriate for the specific issues relevant for that sector. The aim will be to encourage the membership to take an interest in these promising new developments and to consider testing, evaluating, trialling and eventually deploying them in solutions specific to themselves (e.g. mobile network operators could be interested to see which novel mobile internet applications for travel and transport could be enabled by a dedicated Transport and Mobility Internet platform and other tools).

ERTICO is dedicated to the application of advanced technologies for transport and mobility, and will keep mostly to this domain. However, we also use the advantages of Future Internet to exploit new markets for ITS, thus going towards public transport, goods transport and logistics operations, as well as markets making use of personal mobile communication and Internet connectivity, to integrate mobility into related domains such as healthcare, electric vehicles and supply, climate action, financial and related services, etc.

6.1.7 FRANCE TELECOM

FT with its 123 million of European customers (200 million worldwide) has to improve regularly networks infrastructures. These infrastructures provide the common basis of the future networks to connect users, different communication devices, computers, sensor networks and applications for mobile and fixed networks. Instant Mobility results will significantly extend connectivity beyond the systems, which are available today. The number of mobile devices will continue to grow and soon exceed the number of fixed network devices. The number of such smart devices is increasing further by developments such as small applications for always connected services. In addition, mobility of people and goods increase significantly every day the data traffic volume especially with real-time applications. This is requiring a further increase of available capacity and

bandwidth in transport and access networks in order to support the requested Quality of Service and France Telecom should take substantial benefits through these new traffic sources.

The today's Internet protocol has been designed for fixed network applications and future mobile technologies for high bandwidth when Intelligent Transport Services will also required on-demand and adapted bandwidth. The mobile network would provide relevant support for Vehicle to Infrastructure and Vehicle to Vehicle communications, as well as to collect and host large amount of data.

Future real-time multimodal services will not suffer limitations in Quality of Service like in the today's mobile Internet and the improvements could be done following new communication models and standards.

As France Telecom is the EPC Global provider in France, we will be able to test, deploy and apply the most significant results of Instant Mobility regarding Trucks in the city and manage data services and storage solutions for multimodal services.

The FT M2M centre is specifically interested in the Instant Mobility results for potential tests and trials based on ITS in city environment and deployment of in-car services.

During the Instant Mobility project duration, 2 internal workshops per year will be organised with the relevant Business Units in the different countries of the European France Telecom footprint to assume the dissemination of the results and to shorten the time between Research and commercial exploitation In this perspective, the Instant Mobility project will support France Telecom Group and its FT brand in a best-in-class Mobile Internet of Services operator, by providing enhanced intelligent domain-specific services facilitating the European services implementation and based on the valorisation of large and complex contextual information conveyed on the mobile internet network.

6.1.8 IFSTTAR

INRETS and LCPC merged on 1 January 2011. IFSTTAR stands for French institute of science and technology for transport, development and networks. This Institute is a French State-owned research Institute under the authority of two ministries: Ministry for Higher Education and Research and MEDDTL: Ministry of Ecology, Sustainable Development, Transport and Housing. The new activities of research, development and innovation are:

- Urban engineering
- Civil engineering and building materials
- Natural hazards
- Mobility of people and goods
- Transport systems and means and transport safety

As a research organisation, all results of Instant Mobility are of interest. In particular, IFSTTAR has developed the main parts of the ITS Vienna Congress demonstrator, composed of a multi-agent mobility simulator and a guidance platform. The participating researchers will keep on improving the demonstrator in the near future. IFSTTAR will apply the results of its contribution to Instant Mobility to enhance and widen urban planning understanding and to improve its capacity to integrate user’s preferences, acceptance and concern within its multi-modality studies and trip planning.

IFSTTAR develops several services orbiting a multimodal platform (called ClaireSiti). The platform is fed with data from road operators and public transport operators. Three new aspects will be gained from the participation in Instant Mobility:

- The integration of travellers in the platform: until now, the travellers are "invisible" for the platform; we only receive aggregated information about them (density, distribution) from the operators. IFSTTAR will use developments that we will provide to Instant Mobility to have a micro level representation of tracked travellers in ClaireSiti.
- The integration of simulation capabilities into the platform: until now, the platform provides a mutual representation of the current networks status. However, it cannot provide an estimation of future network states. The fact of highlighting interdependencies, by the identification and description of related actors, sub-networks (composed by user, vehicles, infrastructure) and communities, analysis of the stakeholder needs and roles will lead to shape more adapted scenarios for future mobility.
- The use of the pair platform/simulator for the testing of all sorts of new online transport services: services that benefit and use the continuous localization of travellers and transport means.

Another direction for the exploitation plan of IFSTTAR is to work on the scalability of multi-agent simulators for travellers' mobility. The objective is to be able to simulate tens of millions of simultaneous multimodal travels on huge geographic zone. To fulfil this objective, IFSTTAR has launched a PhD thesis offer (to start in September 2013) in collaboration with the University of Cardiff on this subject. The thesis would also be supported by the EU COST action ARTS (Towards Autonomic Road Transport Support Systems).

Finally, an ongoing thesis will benefit from the developed simulator and platform for the testing and the validation of a tool for crisis management that is being developed.

6.1.9 ISBAK INC.

ISBAK is an affiliated company of Istanbul Metropolitan Municipality with more than 350 permanent staff working to provide the best technology and services around the world mainly in the field of Intelligent Transportation Systems. Road and traffic management, lighting management and urban security management are the other areas of activity of the company.

By means of accessibility and wide-spread usage of Internet, presentation of individualized instant traffic information via different platforms is among the on-going projects of ISBAK. Since the milestones of Instant Mobility are in parallel to the current project phases of ISBAK, the outputs of Instant Mobility will be supportive and beneficial during the development of transportation related projects.

ISBAK will be able to exploit international know-how during this project development. Although ISBAK has experience in collaborative EU projects, Instant Mobility will fortify the global thinking aspects of the company.

Currently, ISBAK is struggling with spreading the usage of mobile applications in transportation related solutions provided to public. In this sense, Instant Mobility will contribute to the progress of researches which will facilitate the access of individualized traffic information in the FI domain.

6.1.10 SWARCO MIZAR

The core activities of Swarco Mizar are research, design, development and the implementation of integrated telematics systems and services for the supervision, monitoring and control of traffic and transport.

Swarco Mizar would like to take advantage of the FI enablers such as mash-up of different information from different sources in the cloud, social networking, cloud computing and virtualization. In this project, we would like to take an advantage to study on how to use and bring the FI enablers directly to our product lines and through combinations of this to bring about new innovative applications that improves traffic efficiency and in general emission level in transportation networks. We believe that IM project will bring our products services and information to be used in the cloud by the new cloud value chain stakeholder (cloud content provider or service provider and vice versa). The implementation of FI enablers coupled with innovative applications, it will bring reduction in costs of traffic management and monitoring platforms and traffic management control systems for our client municipalities, cities, public authorities and private companies, etc.

We are planning to demonstrate our first phase studies and outcomes partly followed by a full implementation and demonstration in the second phase in Trondheim, by working together with public authority for transport of Norway and also other cities that will be proposed in the project.

In Norway, Swarco Mizar has already implemented a modern PT and traffic management systems platform. This we believe that will help us to make studies, tests based on the objectives of IM project.

6.1.11 NOKIA

As the leading global provider of maps, traffic, location data enabling navigation and location based services, NAVTEQ is committed to lead the development of location based services and supporting the creation of location enabled solutions targeted at efficient and multimodal navigation applications for an improved and sustainable urban mobility. The map and location are a central component of mobile and internet based solutions as has been demonstrated by the recent high market penetration of mobile location based applications and the launch of free navigation solutions by mobile manufacturers or mobile network providers. Today's maps are extremely dynamic and a continuous input from the communities and a high availability of the data owned by local authorities merged with field services will guarantee a high level of quality and coverage. At the same time, users need to be able to receive location information and dynamic content on different platforms while travelling.

Its participation in the Instant Mobility Project will allow NAVTEQ to participate with a large scope of the European industry on the specification and integration of location-based services in the future internet framework.

The results of the Instant Mobility project will allow NAVTEQ to improve existing products, identify and specify new services thus ensuring that NAVTEQ continues creating the Map driving a mobile world and offering optimal solutions for better mobility.

A key element of the exploitation plan would be the integration of three outputs from the Instant Mobility project into our product portfolio and services:

- The creation of precise indoor maps connected with the outdoor ones is an obvious necessity to support the needed accuracy in indoor positioning research.

- Enhancing map content beyond traditional ways by adding trusted sources (e.g. public authorities) and social networks feedback would be reflected in creating an optimal system to guarantee an up-to-date map.
- Improving map update mechanism, by ensuring more frequent update of the map will be reflected in developing new ways to keep the Map as fresh as possible. This will accelerate map delivery for ordinary connected travellers (e.g. via satellite or other Future Internet enablers).

NOKIA, as the mother company of NAVTEQ, will foster this initiative especially by providing NOKIA's technology needed for development.

6.1.12 NICE CÔTE D'AZUR

Nice Côte d'Azur Urban Community (NCA) is committed to developing an intelligent and sustainable city with particular focus on sustainable urban mobility.

The Instant Mobility project fits perfectly into the strategy that NCA wants to implement in the Eco-valley, i.e. a reference model territory in urban sustainable development and granted with "National interest project" status and supported by national funds. NCA wants to set up an innovative multimodal service based on the Instant Mobility personal travel companion, coupled to indoor geo-localization system. This solution could be linked to the future NCA smart parking service.

Multimodal transport modes are keys in NCA sustainable development strategy. The Instant Mobility results will be directly exploited to enhance existing sustainable mobility heavy project investments aiming at reducing traffic congestion and improving national and interurban transport connections. These projects, mainly the city centre Thiers, the refurbishment of the central train station and the Nice Airport/St Augustin multimodal hub (gathering airport, train station, motorway, bus and tramway lines, bike sharing, etc), and the electric car-sharing newly launched innovative services.

The Instant Mobility project results will facilitate the take up of new technologies and services across the city of Nice that will facilitate the decision making process of end-users in favour of the large panel of transport modes alternative to road.

In addition, in line with the last year successfully launched "NFC contactless city" project applied to transport, culture, commerce and national heritage, NCA will ensure that end-users are involved in the project implementation phase as early as possible and that project results are tested amongst them. NCA finds the "living lab" approach essential to guarantee that new technologies and related applications are successfully introduced and nicely match the end-users interests and expectations.

That approach will be followed in the Instant Mobility project in order to foster the share of sustainable transport modes in Nice Côte d'Azur and progressively decrease the road traffic congestion and pollution."

6.1.13 STATENS VEGVESEN

Statens Vegvesen has participated in CVIS, and one of the largest CVIS test sites is located in Trondheim. We believe that participation in the Instant Mobility project, with its strong industrial partners, can allow us to further focus on utilisation of safety, efficient and environmental aspects of future M2M communication. Statens Vegvesen is a national supplier of both static and dynamic

road related data. We are dedicated to encourage data utilization according to our national ambitions for safety and efficiency. Future internet solutions can assist this development.

We will use new standards and technology obtained in this project as a basis for future national and European projects. Statens Vegvesen is prepared to participate in the later phases of the Instant Mobility project with a large demonstrator in Trondheim together with the project partners. The current implementation of a modern PT and traffic management scheme can be further developed through the Instant Mobility project. We are also seeking proof of concept for the benefits of M2M information.

Management of multimodal transport modes for both people and goods are vital in Norway to allow a greener and improved use of the current road network. We are eager to participate in technology enhancement probable to assist this development. Instant Mobility is regarded as a vital project for obtaining our future strategies.

In our pilot city – Trondheim - there is a cooperation and joint solution for new roads and transport solutions between Trondheim municipality, Sør-Trøndelag County Municipality and the Norwegian Public Roads Administration. Trondheim is growing rapidly and in need of an improved traffic scheme. The aim for this cooperation - Miljøpakken - is that all new traffic growth will be by green transport like walking, cycling and bus

The aim for green traffic growth needs more support than just reduced bus fare costs and traffic restrictions for private traffic. A real time information system implemented on all buses gave a boost, and the city is looking for new technology solutions to support its schemes.

Statens Vegvesen has been most active in Scenario 3 – Transport infrastructure as a service, and we are progressing with the achieved results here regardless of no stage two in Instant Mobility. Statens Vegvesen has also participated in some Scenario 1 – Personal travel companion tasks. A local survey within Instant Mobility raised the focus on multimodal information systems, and we will progress with this topic in Trondheim outside the Instant Mobility project.

6.1.14 PERTIMM

As an SME involved in search appliance domains, Pertimm mostly deals with data looking for a relevant matching between the query and the retrieved documents or items. In the Instant Mobility project, Pertimm's know-how has been adapted to an itinerary search taking into account user profile (preferences). The new matching processes involved enabled Pertimm to enlarge the scope of applications in which to integrate its technology. This technology has to be applied on real time data. The results also have to be well understood by the end-users. It opens new markets; transportation only represents one of these. Pertimm aims at being considered not only as a search engine provider but as a high level technology provider in matching and searching among real time data.

The work done by Pertimm in Instant Mobility project has enabled Pertimm to:

- develop new services in SaaS mode around the core of the search engine. Before Instant Mobility, our clients accessed, in SaaS mode, the search engine via the engine APIs. Now we benefit from the new architecture we set up during the project. This architecture proposes APIs, in SaaS mode also, but between the client and the engine. New services, more client oriented or application specific, can thus be proposed. In the scope of Instant Mobility, this has been used for the itineraries. It is not only dedicated to this application and will be used in any case when pre-processing of data associated to the query is needed or post processing before answering the client.

- improve real time data processing: A SaaS module has been implemented to take care of the online dynamic update of data (real time update). In the case of Instant Mobility, the update refers to itineraries but the module that has been defined will be used for any client needing real time update (such as tracking in a recommandation purpose for instance)
- optimize search processes: dealing with large volumes of data such as itineraries, it has been necessary to work on this optimisation which benefits to all applications.

6.1.15 TELECOM ITALIA

By participating to Instant Mobility Telecom Italia will achieve a more comprehensive understanding of future services and the future networks capabilities; this will allow to enhance services offered on mobile terminals. Instant Mobility results will help to improve in particular services related to mobility and transport domains including travel information, traffic status, transports time and fares going towards a multimodal approach for travel. Also we expect to gain knowledge about integration between smartphones and transport-related objects like OBUs and infrastructure; and to get a better understanding of scenarios and algorithms related to the transportation organization that may help us to develop related services and applications for our customers. Moreover, mobility services will be improved using the cooperation between mobile terminals and on board devices, as addressed in Instant Mobility sustainable cars scenarios.

Telecom Italia believes that the world of transport related services is going to be dramatically transformed by leveraging connectivity and localization of people and things. Telecom operators will be among the main actors involved in this process, not simply carrying bits but providing valued information to human and “machine” data consumers; for instance mobile networks may significantly contribute to facilitate and enhance localization; operators may also contribute to perform low level data aggregation. This vision is quite in harmony with the FI-PPP approach, focused on identifying common and usage area specific enablers and Telecom Italia expects that many of those enablers will need the contribution of fixed and wireless network operators in order to become really available and effective. TLI believes that features like localization, data aggregation, vehicle data availability and open mobile framework for developing services and cooperating with on board devices are key elements that could be used to deliver future services.

Besides building its own mobile services and applications, Telecom Italia also wants to encourage the growth of a large community of developers that can easily plug their mobile applications on the open mobile framework, which gives access to both devices and network capabilities in a standard way. Since Telecom Italia intends to promote this approach also in Instant Mobility, the project results will be highly exploitable and re-usable in mobile applications development both in Telecom Italia and in the developer community; opening new market opportunities particularly in relation to smartphone-vehicle integration, and proximity-Internet of Things, particularly related to interaction between smartphone and objects.

6.1.16 TELEFÓNICA I+D

INSTANT MOBILITY is a core project for Telefónica in order to define its strategy in the transport, mobility and logistic area, in a more general way, in the machine-to-machine field, that has been recently identified as one of the most promising growth engines for the company.

Even if the result after the end of the project is not a complete system that can be in the market, the activities to be performed within the Instant Mobility will allow Telefónica to be positioned in the place and moment where the decisions over the Future Internet will take place, so that exploitable products from Telefónica are aligned since the early beginning with the FI enablers.

One hand, the data mining that is to be done by the platform from the different data sources engaged in the Instant Mobility system (public operators, traffic information, smart city data, etc.) can be used by Telefónica in order to create services for its customers in the vehicle or outside it, especially if the services can be delivered in mobile phones or in aftermarket devices.

This situation will position Telefónica in the market offering an added-value for its direct customers.

In the same way, new enriched data (from the combination and processing of the different data sources) can be offered to Third Party Service Providers, enabling and easing the provision of end to end services for them. In this second case, the business model is of type B2B2C (business to business to customer), which allows specialized companies to create best-in-class services by joining optimum M2M communications platform, meaningful data, its knowledge in the field, and their traditional relationship with the final customer.

Moreover, TID is currently working in a general Ambient Intelligence platform (IDAS) as part of the machine-to-machine strategy at Telefónica. We envision aligning the results from the Instant Mobility with the definition and specification of this platform.

6.1.17 THALES

Within the THALES Group, the Ground Transportation Systems (GTS) Global Business Unit (GBU) is in charge of all transportation activities. This GBU is organized around four business lines:

- Signalling for Main Lines (MLS)
- Signalling for Urban Rail (URS)
- Integrated Communications and Supervision Systems (ICS)
- Revenue Collection Systems (RCS)

These business lines are specifically addressing transport operators, our main customers. Among these business lines (BLs), three of them are interested in the outcomes of the Instant Mobility project and will benefit from them:

- Within the “Signalling for Urban Rail” business line, Thales develops interoperable systems providing real-time location and context positioning (number of passengers, time before next train, etc) through its ATS (Automatic Train Systems) offer.
- The “Integrated Communications and Supervision Systems” BL is more specifically in charge of train supervision systems and passengers information..
- The “Revenue Collection Systems” BL is in charge of global ticketing systems and payment systems..

Thales main outcomes from Instant Mobility are twofold:

- With the work done in WP3 for use case and services definition has allowed us a fine characterisation and validation of new business opportunities and capabilities. What was simple technical hypothesis about geo-location and individualization before the beginning of the projects has been translated into precisely defined business cases. With the work done in WP6 & WP7, the potential business cases and opportunities have been effectively and successfully tested against the main stakeholders (travellers, drivers and cities representatives). The social acceptability of the proposed multi-modal travel tools and their implied continuous geo-location is now proven (within the limits drawn by the answers to the different polls).

- In parallel, the work done in WP4 & WP5 have allowed us to validate the feasibility of the individual assistance and monitoring of hundreds of thousands of travellers in real-time and to clarify the issues of scalability and security. The Scenario 1 reflects these results and the corresponding prototype demonstrate them.

Based on these results, Thales will promote a new passenger information offer toward its customers, i.e. the transports operators and cities authorities and provide a better and more accurate end user traffic information and for optimisation of their activity.

The scenario 1 is currently being interconnected with the Thales Standard ATS offer to adjust dynamically the train timetables based on the estimated current and future travellers. Additional work will be done and new payment paradigm will in a near future be tested them using the current prototype.

Finally, Presentations of these results in the main French cities are planned in the second half of 2013.

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6.1.18 VALEO

Valeo, as an automotive Tier One company, considers that the deployment of Future Internet and associated use cases will provide considerable business growth opportunities. Indeed, following technologies will experience considerable growth:

- Connectivity between vehicle and smart phones, e.g. to allow safe use of smart phone (to access Future Internet services) through vehicle HMI, adapted to driving conditions,
- In-vehicle NFC technology to authenticate car users and passengers, e.g. car sharing and car pool use case scenarios,
- In-vehicle cameras and recording.

Valeo has multiple product lines that can take advantage from this market expansion:

- Display products will benefit from the need to enhanced HMI
- Connectivity products will benefit from the need to connect vehicles and smart phones
- Vision products will benefit from the need to increase car sharing safety

Therefore Valeo intends to invest in Instant Mobility to accompany Future Internet deployment, and thus gain leadership and market competitiveness.

6.1.19 VOLVO

Volvo AB, as one of the global and leading OEMs and Total Transport Solution Provider is committed to provide and utilize high-end technologies to its customers and product life cycle management. With this mission as the background, the ultimate aim for Volvo is to provide the cost efficient, secure and sustainable solutions for public and goods transport. The concept of fully networked vehicle provides new opportunities for added-value, customer-oriented services directly related to vehicle, transport mission and product life cycle management. As our main products are mobile and critical assets for our customers and the society, the requirement on communication channels, QoS and required features are at a high level.

Instant Mobility is the right project for Volvo to evaluate the current features in a new world of connectivity and get prepared for evolution and revolution in enhancement and development of existing and upcoming services and products. The main goal for Volvo in this project is to highlight

the challenges from transport industry in a mobile and connected world of things as well as to bring in state-of-the-art technology into its own business for supply-chain management.

6.1.20 VTT

As an applied research institute VTT has especially a target to use the know-how developed in the Instant Mobility project to apply Future Internet platform and enablers more to the Finnish urban mobility system development. The current very strong trend is to bring different kind of services to mobile users. VTT wants to increase the awareness and knowledge of public and local authorities to realise the digital convergence in terms of mobile handsets and vehicles.

VTT has already utilized the IM findings and scenarios when analysing the opportunities of new Intelligent Transport Systems implementation and expected impacts in the city of Helsinki. In the future, VTT will continue close co-operation between the urban areas, other public authorities and private service and systems providers.

Furthermore, VTT is willing to exploit the results in other application areas of ICT and M2M provides today.

The Instant Mobility project and other Future Internet Public Private Partnership projects will have a notable effort on development of Intelligent Transportation Systems. VTT will be actively promoting the possibilities of FI in realization and implementation of Finnish ITS strategy. VTT will also motivate Finnish public sector – especially large urban areas – and private companies to take active role in future large-scale actions such as ELSA for transport or the Europe-Wide Service Platform.

6.1.21 TNO

TNO can exploit the knowledge build up in the project in several ways:

- The project (and PPP-FI program) has attracted interest from Dutch partners of TNO, and will be brought to the attention of others. These partners range from service providers for motorists, technology providers to local governments. These organizations can provide valuable input to the use cases. On the other hand, these organizations will also benefit from the results of the project as the application scenarios described by the project are fed back to them in a comprehensive way. TNO has an excellent track record to transfer and use technical expertise towards motivated user-organizations. Thereby, these organisations get an overview of the information needs of others along the entire chain.
- The results of the work package on the design of multi-modal transportation services will improve our expertise on privacy and acceptability by users, used to create compelling service concepts. In general service concepts have a generic element and a domain-specific element. With the improved expertise TNO will be able to create state-of-the-art and compelling service concepts in (slightly) different multi-modal transport situations. TNO is currently developing a platform that aims to collect large scale mobility data, in order to offer services along the lines of travel time predictions, both for private transport, public transport and multimodal transport. The platform will be exploited in a separate platform.
- The knowledge and ideas of how to perform use cases on top of a future internet and its services are also exploited towards organizations that are not in the mobility sector, e.g. the government sector and the electricity domain. This knowledge can be used much broader and can also lead to benefits in these sectors on new possibilities for IT on future internet. Part of the mission of TNO is to make this kind of knowledge available in various societal and economic sectors. To a large extent, the Future Internet overlaps with Big Data

initiatives and precisely at this point TNO is currently developing a proposition where use cases for a range of sectors are explored and brought to value (as part of the Almere Data Capital initiative).

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8. Annex I – Liaison projects

Project name - type & end date	Description related to the domain addressed	What Instant Mobility Expect to make use of
- COMeSafety FP6 SSA Dec 2009	The COMeSafety Project supports the eSafety Forum with respect to all issues related to vehicle-to-vehicle and vehicle-to-infrastructure communications as the basis for cooperative intelligent road transport systems. COMeSafety provides a platform for both the exchange of information and the presentation of results. http://www.comesafety.org	Consolidated European architecture for cooperative systems (V2X)
SEAMLESS French 2008 ANR	IP connectivity for public transport vehicles & for IP standard -based vehicle-to-infrastructure connectivity across WiFi and 3G accesses. http://www.systematic-paris-region.org/fr/projets/seamless	Results from project
- Intersafe-2 FP7 STREP 2011	V2X communication on urban intersections, Different safety scenarios covered and their functionality tested.	Scenario from urban intersections areas for driver assistance and technical functionality of V2X in urban intersection scenarios
CVIS 2010	The FP6 CVIS project defined a global platform for cooperative communications and services. CVIS developed an open architecture and prototype of cooperative on-board units, roadside units and necessary back-end infrastructure enabling vehicles to cooperate with each other, with the roadside infrastructure and with back-end services. http://www.cvisproject.org	1-Reuse CVIS cooperative systems architecture; communication, positioning and application management components; reference platform software for floating vehicle data, cooperative urban traffic control, fleet management, traffic information and management
P-Innovations Finnish 2007	Parking guidance using long range RFID http://www.vtt.fi/uutta/2007/20070613.jsp?lang=en	Project results
COOPERS FP6 IP Jan 2010	COOPERS focuses on the development of innovative telematics applications on the road infrastructure with the long term goal of a "Co-operative Traffic Management" between vehicle and infrastructure http://www.coopers-ip.eu	Privacy results and Galileo evaluation
eCoMove FP7 CP Mar 2013	eCoMove focus on integrated driver assistance systems for energy efficiency. By applying communication technologies for vehicle-to-infrastructure and vehicle-to-vehicle communication, the project will create an integrated solution comprising eco-driving support	Use the basic concepts, e.g. real time feedback to the driver regarding driving behaviour, for urban eco logistics

	and eco-traffic management to tackle the main sources of energy waste by passenger and goods vehicles. http://www.ecomove-project.eu/	
TeleFOT FP7 IP 2012	Use of nomadic devices as driver support on various traffic information like road conditions, hazards, feedback on behaviour, congestion. Field Operational Test.	Use the results of road tests, preferred services, their impacts and use of nomadic devices
EuroFOT FP7 IP 2011	"Smart drive" to test various intelligent in-vehicle systems across Europe, with the aim of making our road transport safer, more efficient, and more comfortable. The large-scale European Field Operational Test on Active Safety Systems	Use results, data collection methods, user experiences (like TeleFOT and DRIVE C2X)
CityLog 2013 STREP CityMOVE 2010	CityLog will increase the sustainability and the efficiency of urban delivery of goods through an adaptive and integrated mission management and innovative vehicle and transport solutions. (http://www.city-log.eu/) CITYMOVE aims at developing an innovative integrated vehicle solution fitting with the integrated city transport solution approach for a secure, flexible, reliable, clean, energy efficient and safe road transportation of goods across European cities. (http://www.citymoveproject.eu/)	Reuse basic concepts of smart and integrated logistics in urban areas
E-Freight FP7 CP Jun 2013	E-Freight address information visibility in the supply chain. The e-Freight Integrated Project is addressing the development, validation and demonstration of innovative e-Freight capabilities. E-Freight service networks adhering to co-modality principles for improved efficiency and end-to-end quality of surface freight transportation to exchange information with other authorities for collaboration in security and environmental risk management. http://www.efreightproject.eu/	Taking advantages of the suggested framework regarding electronic exchange of freight related information between different actors.
EIT Sweden national Project 2011	The Efficient and Integrated Transport Processes (EIT) project is a national collaboration project including 9 partners within the transport industry such as DHL, DSV and Schenker. The purpose with EIT project is to identify and analyze different options to develop and harmonize the administrative processes, business and process integration between transport companies, industry and authorities. The aim is to increase transport efficiency with consideration to new requirements and applications for sustainable and secure transportation. http://www.transporteffektivitet.eu/	Specification of stakeholder's need and requirement for future ICT aiming to enable and improvement of innovative transportation processes and business.
eMOTION FP6 STREP – Apr 2008	Project has investigated and specified a framework for a Europe-wide multimodal traffic information service offering real time information and special services for the road and public transport use	eMOTION Specification & data model

	http://www.emotion-project.eu/	
Euridice FP7 CP Dec 2010	The basic concept of Euridice is to build an information services platform centred on the individual cargo item and on its interaction with the surrounding environment and the user. http://www.euridice-project.eu	Euridice Data model for business processes; online services library for intelligent cargo
FREILOT	The FREILOT pilot project focus on increasing energy efficiency of urban freight through deployment of ITS services. By applying a holistic management on a combination of services for traffic- and fleet- management, vehicles and drivers a reduction of fuel consumption on up to 25% is suggested. http://www.freilot.eu/	Reuse the concepts for energy efficiency, e.g. load latency and loading/unloading space booking, in urban transports
GST FP6 IP Mar 2007	GST strove to develop an environment in which innovative telematics services could be developed and delivered cost effectively and thus increased the range of economic telematics services available to manufacturers and consumers. GST S-PAY sub-project provided an architecture for the electronic billing and payment of car Telematics Services as part of the global GST framework. http://www.ertico.com/gst-website/	Reuse some operational concepts Reuse architectural and functional decomposition of processes for single payment
- INTIME FP7 STREP Aug 2012 - ASSET FP7 STREP 2011 - Claire-CITI French -CONDUITS	Traffic Events and Trip Planner service are available with European Specification http://www.in-time-project.eu Traffic monitoring technologies and communicating information to road operators and drivers. http://claire-siti.inrets.fr/ Ongoing project about the information sharing of ITS applications and traffic management. http://www.conduits.eu/	INTIME CAI Interface Specification Monitoring data for tests, scenario definitions, I2V Smart system for Intermodal Transports Tools in development
iTravel FP7 STREP Sep 2009	Project goal was to develop, validate and demonstrate an innovative solution for a personalised, context-aware online 'virtual travel assistant' service for travellers, both before and throughout their journey, based on the integration of e-commerce and internet technologies to create the first 'e-marketplace' in the traffic and travel information services sector, through which - creation of a wide-ranging community of information and service suppliers who through i-Travel can expand their customer base while fulfilling travellers' needs. http://itravelproject.wordpress.com	iTravel API for mobile devices

NSFrits	North Sea Freight Intelligent Transport Solutions (NS FRITS) is a project co-funded by the Interreg IVB North Sea Region Programme. The aim is to improve accessibility for the road freight sector in the seven countries of the North Sea Region by improving safety as well as efficiency and reducing the risk of accidents and security threats for drivers of Heavy Goods Vehicles. The system will help: improve traffic flow addressing logistical problems around congestion and freight volumes http://www.nsfrits.eu/en/	Reuse of the concepts for data integration and smart information dispatching and exchange. Information portal and partner agreement for integration of data coming from different data provider exists.
Optitrans	Create a Mobile GNSS platform to provide commuters & travellers with the ability to plan their trip in an efficient manner in order to utilise and share a combination of public/private transportation by combining information from various public transport authorities and other private vehicle owners. http://www.optitrans-fp7.eu/	Mobile GNSS platform
Persist FP7-ICT-2007-1 Apr. 2008 – Oct. 2010	PERSIST has defined specification and develop tools to create Personal Smart Spaces providing a minimum set of functionalities which can be extended and enhanced as users encounter other smart spaces during their everyday activities. Users interact with smart spaces through mobile terminals, thus the smart space become a Personal Smart Space. The personalization is based on user behaviors and context aware information. The smart space is composed by sensors and actuators.	Method and tools for context aware and personalized services
Infomagic (French ANR)	Semantic processing of high volumes of data http://www.infomagic.com/	
Doxa (French Cap Digital)	Extract moods and emotions from textual data https://www.projet-doxa.fr/index.php	semantic/real-time approach reuse of the different projects results
SOLEN (2010 CNRS)	interaction with mobile devices http://www.medialab.sciences-po.fr/index.php?page=Solen	
Topos ADREVA 2009	Connection with social data http://www.concertation-topos.net/	
PRECIOSA FP7 CP 2010 Humanist NOE	Demonstrate that co-operative systems using V2V and V2I communication can comply with future privacy regulations. http://www.preciosa-project.org Acceptability and user-orientation NoE see http://www.noehumanist.org/	Privacy verifiable architecture, mechanisms for V2X privacy Ergonomy, acceptability

- Pre-drive-c2x FP7 CP Jun 2010 - DRIVE C2X FP7 IP 2013	Develop methods and tools for vehicular communications. Create most likely scenarios for services to be tested. http://www.pre-drive-c2x.eu Traffic s scenarios created in Pre-drive C2X to be tested in Field Operational Tests across Europe	Methods and tools for vehicular communications User experiences, impacts. Most preferred services.
SAFESPOT FP6 IP Jan 2010	SAFESPOT creates dynamic cooperative networks where the vehicles and the road infrastructure communicate to share information gathered on board and at the roadside to enhance the drivers' perception of the vehicle surroundings. http://www.safespot-eu.org/	Infrastructure and in-vehicle sensing platforms
Smartfreight Jun 2010	This project will make urban freight transport more efficient, environmentally friendly and safe through smarter use of the distribution networks and improved delivery and return-load systems. The basic idea is to integrate urban traffic management systems with freight management and onboard systems. http://www.smartfreight.info	Smartfreight framework architecture and reference model including CALM Mail implementation reference

- FINest
- fi-ware
- INFINITY
- CONCORD
- e- Justice
- WCAM
- µDrone
- IMPACT
- Use-it
- PROTECTRAIL
- DEMASST
- SECUR-ED
- NEXOF-RA
- COMPAS
- SEMbySEm
- EBSF
- ISSTE
- PM'N'IDEA
- CITYMOBIL
- OverDRiVE
- AIM
- ITS Test Beds
- 4WARD
- SAIL
- eMobility ETP
- 4Caast
- Cityzi
- SCOREF

- P@ss-ITS

9. Annex II – List of external events attended during the duration of the project

Event	Partner	Details
FIA, Budapest, Hungary, 17-19 May 2011	Thales	Participation as Coordinator to promote the project and the FI-PPP
Volvo Tech Show 2011, Gothenburg, Sweden, 23-27 May 2011	Volvo	Presentation of the project
EUCAR Board, Brussels (BE), 26 May 2011	Thales	Presentation of the project
Future Internet Summit, Luxemburg, 6-7 June 2011	Thales	Presentation of the project
STOA (Science and Technology Options Assessment) panel meeting, European Parliament, Strasbourg, France, September 2011	Thales	FI-PPP support
Orange Strategic Program "Smart Cities", 1 October 2011	Orange	Presentation of Instant Mobility scenarios (based on D3.1)
European Innovation Summit – Future Internet, Smart Cities, Brussels, BE, 11 October 2011	ERTICO	A presentation on Instant Mobility and Future Internet enabled innovations in smart cities
SAME Conference, Sophia-Antipolis, FR, 12 October 2011	Orange	Overview of Instant Mobility in the context of the PPP Future Internet program and related technological aspects for future mobility and associated services.
ITS World Congress, Orlando, US, 18 October 2011	ERTICO, Thales, Orange, Ericsson, Volvo, VTT	Special Session (SS42) organised by Instant Mobility on Future Internet
FIA, Poznan, Poland, 25-26 October 2011	Thales	Participation as Coordinator to promote the project and the FI-PPP
FI-PPP Information Day, Helsinki, FI, 1 November 2011	VTT	Presentation of Instant Mobility goals and scenarios.
Road Infrastructure Managers, 10 January 2012	Orange, NCA (Nice Côte d'Azur)	Joint dissemination activity to present and discuss Instant Mobility scenarios with stakeholders (road and public transport authorities)
Public Transport Authority, 17 January 2012	Orange, NCA (Nice Côte d'Azur)	Joint dissemination activity to present and discuss Instant Mobility scenarios with stakeholders (road and public transport authorities)

Orange Technocentre meetings, 7 March 2012 and 15 March 2012	Orange	Presentation of Instant Mobility scenarios to Orange Technocentre to include them as support of "Orange 2015 Internet of Things Roadmap".
II Jornada Logística de Euskadi - Universidad de Deusto, Bilbao, Spain, 8 March 2012	DHL	Disseminating the project in the framework of DHL presentation at this national event
Tampere Smart City meeting, Espoo, FI, 12 March 2012	VTT	Overview of Instant Mobility in the context of Smart Cities and transportation
Future Internet Assembly, Aalborg, Denmark, 9 May 2012	Thales, Volvo	Presentation by the project in the FI-PPP Call 2 info session organised by CONCORD, and FI-PPP booth (the project flyers were distributed)
3rd European Summit on Future Internet, Espoo, Finland, 31 May-1 June 2012	Thales, VTT	The two-day summit included many interesting presentations and panel discussions. To summarize, the future was seen as more global – European stakeholders need to co-operate with e.g. Asia, Middle-East, Russia, US. In addition, the plans for Horizon 2020 – as seen in May 2012 were considered very positive, supporting the global co-operation. In addition, the role of different stakeholders, open data, and various business models were also discussed broadly. Social networks, security and privacy were seen as important issues to be taken into account when planning and implementing the Future Internet enabled services. Instant Mobility was well presented in the panel discussion by the project coordinator.
Réunion Réseau Mobilité et Déplacements, Nice Chamber of Commerce, Sophia Antipolis, France, 14 June 2012	France Telecom	Participants: 35 persons. Audience: local transport and mobility actors as public transport operators, Intermodal node project manager, Municipalities, ADEME (French subsidized association for Sustainability and Energy reduction), car-pooling operators. The audience was very interested. There are been a lot of questions, related to trust issues, cost of the development, means of dash boarding the whole system for local governments, lever to access the application for tourists (especially for roaming issues for data).
HUMANIST Virtual Centre of Excellence Fifth Summer School on the topic of Intelligent Transport Systems: Human Centred Design for	IFSTTAR	Presentation "Ecomobility and nomadic devices", in which some of the main concepts developed in Instant Mobility were introduced.

Safe and Eco-Mobility, Lisbon, Portugal, 5- 6 July 2012		
Conference on Transportation and Routes, Turku, FI, August 2012	VTT	VTT has submitted a proposal on the Instant Mobility technical paper on the largest Finnish conference on Transportation and Routes, held every second year, and targeting especially on cities, authorities, road operators, SME's in transportation.
Idate (a French consulting company) workshop, September 2012	France Telecom	The theme of the workshop is "innovative services in Transport for Smart Cities"
ITS World Congress, Vienna, Austria, 22-26 October 2012	VTT, ERTICO, Telecom Italia, Thales, IFFSTAR, Valeo, Pertimm, DLR, Nokia	• Paper presented by IFSTTAR ("multimodal travel platform") that provides information and services able to support new types of connected transport applications. The scenario "Personal Travel Companion" was the main topic for the paper. • Paper presented by DLR describing in detail the architecture methodology used in Instant Mobility. • Special session SIS 24 "The impact of social media on sustainable travel choices" discussed about the possibilities to enhance the travel and traffic related information by utilizing the social media to collect and share the information. The session explored the impact and potential of social networking, and the factors that could enhance its use in supporting more sustainable travel choices. The relatively unexplored issue of how the impact of social media can be evaluated was also discussed. In her presentation, Pauzie (2012b) discussed specifically about the privacy and acceptability of the related services, emphasizing the importance to make the services suitable also for senior travellers. The presented results covered also the Instant Mobility WP6 results on the surveys in the participant cities • Special Session SIS63 - Bringing energy efficiency into goods transport (Nokia presented Scenario 2 services as a substitute to DHL) • Special Session SIS03 - Multi-modal journey made easy (merger between Instant Mobility and other FI-PPP UA projects, such as Outsmart, initial application and another session proposal): ERTICO and ISBAK presented the Instant Mobility project and a representative from Santander city presented Outsmart • Demonstration of scenario 1 prototype on iMobility Forum stand in the exhibition

IT Suppliers of Orange Business Services (OBS) meeting, October 2012	France Telecom	Instant Mobility presentation related to the new emerging geolocation services.
Future Internet for New Century Cities Conference, Zaragoza, Spain, 8 November 2012	Telefónica	Presentation: "Instant Mobility: Future Internet for New Century Multimodal Cities" Estimated number of participants: 100 (local and from EU, USA and Japan). The subject of the conference was Future Internet for New Century Cities. The organizer was most interested in Instant Mobility scenarios and their relationship to Instant Mobility cities. So, a general overview of the project was given followed by the explanation of the 3 development scenarios and its relationship to Region of Nice, Rome, and Trondheim. Audience was participative. 3rd scenario was perceived as the most innovative but scenario 1 captured more attention. After the presentation, main subject of discussion was around possible ways of exploitation of Instant Mobility results and FI-PPP results.
Nomadic transport services for multimodal mobility seminar, Lyon, France, 15 November 2012	France Telecom	Presentation "Acceptability and social community issues for ridesharing and multimodality success" (http://decomobil.humanist-vce.eu/doc/nomadic/9-Dubus.pdf) WP6 leader presented the main results of Instant Mobility acceptability/social issues studies in the workshop organized by HUMANIST/DECOMOBIL. The presentation gave an overview of the Future Internet, and the goals and overall concept of the "multimodal travelling" in Instant Mobility. Furthermore, the main results of the acceptability studies in Nice, Istanbul, Rome and Trondheim were presented and discussed in detail
THNS Forum (Sino-French Sustainable Development of Urban Transport Systems), Shanghai (China), 17 November 2012	IFSTTAR	A paper in the forum entitled "Future Internet for real-time planning and monitoring of multimodal trips". http://www.urba2000.com/club-ecomobilite-DUD/spip.php?page=document_article&id_article=442
M2M Community Workshop on FI-PPP technical approaches, Telefónica office, 10 January 2013	Telefónica	The Instant Mobility Project" Number of participants: 20 Architecture was discussed and compared against FI-WARE IoT chapter, Outsmart and Finseny. No relevant feedback received since the projects under discussion barely overlap.
ATEXPO ITS Congress, Paris,	IFSTTAR	A paper in the congress entitled: "Un service Internet du Futur pour le suivi des voyages multimodaux" was

France, 31 January 2013		presented in Session D4 “Aide au voyageur” and a demonstration of the simulator developed by Ifsttar for the project IM.
Mobile World Congress, Barcelona, Spain, 25-28 February 2013	Thales, Mizar, Volvo	Demonstration of prototypes from scenario 1, 2 and 3
FI-PPP Event, Barcelona, Spain, 28 February-1 March 2013	Thales, Mizar	Presentation of Instant Mobility results and demonstration of prototypes from scenario 1 and 3
KES-AMSTA (Agents and Multi-agent Systems – Technologies and Applications) 2013 conference, Hue City, Vietnam, 27-29 May 2013	IFSTTAR	Paper "Agent-Based Simulator for Travellers Multimodal Mobility" to be presented. The paper is presenting a proposal for a multimodal travel simulator that allows for the understanding and the prediction of future status of the networks. In addition, it allows the testing of the new online applications and their impact. The application simulates the movements and choices of travellers on the different networks while taking into account the changes in travel times and the status of the networks. The considered transport modes include pedestrians, private cars, all modes of public transport as well as ridesharing.

10. Annex III– Calendar of relevant external conferences & events

Date	Title	Location	Details and opportunities for Instant Mobility	Instant Mobility participation
7-9 February 2012	4th ETSI TC ITS Workshop	Doha, Qatar	Main event for ITS communications standardisation	
8 February 2012	INTERMODES	Brussels, Belgium	International convention devoted to intermodality in passenger transport. Intended for transport sector professionals and stakeholders working for a sustainable mobility.	
15-17 February 2012	IT-TRANS	Karlsruhe, Germany	ITS solutions for public transport	
27 February 2012	3rd Combined Mobility Platform workshop	London, UK	Combined Mobility services such as car-sharing, taxis and shared taxis, bicycles and bike-sharing, car-pooling are complementing the classic fixed line -and timetable-bound - public transport services.	
27 February-1 March 2012	Mobile World Congress (MWC) 2012	Barcelona, Spain	The Mobile World congress is the world's largest exhibition for the mobile industry, an opportunity to meet and talk with several technology providers and vendors who is looking for future solutions in	Several discussions with number of teams inside NOKIA improving the transport products in general including NOKIA Research Centre

			several domains	
March 2012	The Fully Networked Car Workshop @ Geneva International Motor Show	Geneva, Switzerland	Close link to Geneva Motor Show	
6-10 March 2012	CeBIT (Telematics & Automotive World)	Hannover, Germany	Europe's largest IT expo and conference	
27-30 March 2012	Intertraffic 2012	Amsterdam, The Netherlands	World's largest traffic systems expo	
12 April 2012	European Cloud Partnership Info Day	Brussels, Belgium	Launch of European Cloud Partnership, inviting public authorities and industry, Cloud buyers and suppliers, to come together to establish common requirements for Cloud procurement, looking at standards, security, and in later phases delivering proof of concept and reference implementations	
23-26 April 2012	Transport Research Arena	Athens, Greece	Strategic sessions: - **Sustainable mobility in cities for passengers** potential of the most efficient modes of transport - efficient first in terms of energy and space consumption, but also in many other fields like safety or social integration, to be accompanied by an improved integration between public transport modes, a better coordination between public transport and private car usage.	ERTICO represented Instant Mobility

			- **Integrated Transport from the Travellers' Perspective** Discussion on integration of modes will include travel information, physical integration of services and charging means. Special sessions (possibility to submit proposals): - **New solutions for sustainable distribution of freight in Urban Areas**	
2 May 2012	Research in Future Cloud Computing	Brussels, Belgium	Presentation of expert group state of the art review on technological progress made during the last few years in the domain of cloud computing, to identify the major gaps and necessities for future research and development in cloud technologies.	
2-4 May 2012	International Transport Forum	Leipzig, Germany	Theme 2012: seamless transport Sessions on urban connectivity (improving door-to-door journey); rethinking the last mile: new approaches to urban logistics; the Future of Travel: e-Ticketing, Smart Phones, Data Sharing (how are real-time information and integrated ticketing changing passenger transport?); synchromodality	
10-11 May 2012	Future Internet Assembly 2012	Aalborg, Denmark	Collaboration between Future Internet projects to strengthen	– Participation in "Smart City applications and services"

			European activities and permit interactions and cross-fertilisation across technical domains. Bi-annual event	session – FI-PPP BOOTH in the exhibition area – FI-PPP Call 2 Info session, organised by CONCORD and incorporating presentations from all the projects in phase 1
15 May 2012	Second Forum on ITS for Urban Mobility	Brussels, Belgium	DG MOVE has established an Urban ITS Expert Group representing both public and private stakeholders, the objectives of which are to both share best practices in terms of ITS solutions for Urban Mobility and to develop guidelines for the deployment of ITS in Urban areas. The Expert Group has drafted the first guidelines, focusing on three main topics, to be discussed at this event: • Multimodal Information • Smart Ticketing • Traffic Management and Urban Logistics	
31 May 2012 – 1 June 2012	3rd European Summit on the Future Internet	Espoo, Finland	This event will focus on what is the future of Internet and its applications for new business opportunities, but also on international collaboration.	Thales participates in the Session 4: Need for a Single Market for Digital Services Driving Future Internet. VTT and Volvo will also be present.
3-7 June 2012	IEEE Intelligent Vehicles Symposium	Alcalá de Henares, Spain	Annual forum sponsored by the IEEE INTELLIGENT TRANSPORTATION SYSTEMS SOCIETY (ITSS)	

			Opportunity for papers, special session, demonstration and exhibition Topics: Cooperative Vehicle-Infrastructure Systems; Assistive Mobility Systems Deadline: January 2012	
5-7 June 2012	Transports Publics 2012 – the European Mobility Exhibition	Paris, France	- **Exhibition**: innovations for developing intermodality (e.g. real-time passenger information, all-mode travel cards, ticketing over the internet or by mobile phone, optimising changes during journeys, etc) and complementary transport solutions such as car-sharing, car-pooling. - **Round tables/debates** - **Organise an Instant Mobility stakeholder workshop in conjunction**	
6 June 2012	International Internet of Things Event	Eindhoven, The Netherlands	Thanks to ERRIN (CONCORD partner), FI PPP has been offered a 1,5 hours panel involving Fi-WARE, Infinity and 1 or 2 of the use cases projects (IoT oriented) within this regional event which main focus will be on FI-PPP opportunities for regions, cities and SMEs in phase 2 and 3 as well as FI-WARE open calls.	TNO represented Instant Mobility in the panel.
6-8 June 2012	10th International Conference on	Santorini, Greece	Opportunity to submit technical papers on network	

	Wired/Wireless Internet Communications		technologies, protocols, architecture, security Deadline: December 2011	
4-6 July 2012	Future Network and Mobile Summit 2012	Berlin, Germany	The Summit will address the challenges of building the Future Internet Infrastructures, based on mobile, wireless and fixed broadband communications technologies Opportunity to submit technical papers Deadline: December 2011	
August 2012	Väylät ja Liikenne (Finnish bi-annual conference on traffic and transportation)	Turku, Finland	This is the largest traffic/transportation related event in Finland, gathering together all the major cities, transport agencies, traffic management , research organizations, and private companies	VTT have submitted a proposal of Instant Mobility presentation
Second half 2012	ICT 2012	TBC	This European Commission event gathers more than 5000 researchers, innovators and influencers who will focus on ground-breaking developments in ICT and policy priorities such as Europe's Digital Agenda.	
Second half 2012	Future Internet Assembly 2012	TBC	Collaboration between Future Internet projects to strengthen European activities and permit interactions and cross-fertilisation across technical domains. Bi-annual event	
16-19 September	IEEE ITSC 2012	Anchorage, Alaska, USA	Innovative contributions in ITS research and advanced	

2012			implementations and deployments in topics of: - Multi-modal ITS - ITS Implementation - Environmental and Green Transportation - Security - V2V and V2I Communications - ITS User Services Opportunity for papers, special session and workshop/tutorial session Deadline: 15 March 2012	
19-20 September 2012	Chip-to-Cloud Security Forum (Smart Event)	Nice, France	The Forum will be addressing the broad security challenges arising from the “Internet of Things” Opportunity for technical papers but also keynote speech Deadline: 23 March 2012	
8 October 2012	ICT building blocks tackling societal challenges	Brussels, Belgium	Event organized in the European Parliament to illustrate how research contributes to real-life health, sustainability and mobility applications and services. Call for applications from "Made in Europe" components by EC-funded projects to showcase them to MEPs.	
8-10 October 2012	Intelligent Cities Expo	San Francisco, USA	Conference & exhibition built around technologies and solutions for smarter cities, including smart, multi-modality	

			transportation systems	
22-26 October 2012	19th ITS World Congress	Vienna, Austria	Within the theme "smarter on the way", the Congress is dealing with innovative systems for the improvement of mobility	– Special Session Instant Mobility – Viajeo – 2 technical papers accepted – Pre-congress workshop – Prototype demonstration in the exhibition part
November 2012	Polis Annual Conference	TBC	Polis is association of cities for ITS	
14-16 November 2012	13th International Conference on Web Information System Engineering (WISE 2012)	Paphos, Cyprus	Topics of interests include but are not limited to: * Cloud Computing * Discovering Social Web structures and models * Integration of the Web and Internet-connected Objects / IoT; * Linked Open Data; * Web-based Applications	
20-22 November 2012	Smart City Expo World Congress	Barcelona, Spain	- Energy and Sustainability - Mobility and Transport - ICT and Research - Urban Planning - Cities	
21-23 November 2012	TOSM (Torino Software and Systems Meeting) – ITN (Infrastructure, Telematics and Navigation)	Turin, Italy	TOSM provides the opportunity for those who create IT solutions to meet their users. During the exhibition ICT businesses can participate in meetings/conferences, to discuss current technological themes and in technical workshops dedicated to the themes of software analysis and management applications. ICT	Telecom Italia intends to participate and present the project

			businesses can present details of the activities they've carried out and arrange meetings with potential B2B customers. It is co-located with ITN established international event dedicated to infomobility, smart infrastructures, telematics and satellite navigation.	
February 2013	5th ETSI TC ITS Workshop	TBC	Main event for ITS communications standardisation	
February 2013	Congrès ATEC-ITS France	Versailles, France	Opportunity for French partners to present the project and also demo in the joint exhibition (ATEXPO)	
March 2013	The Fully Networked Car Workshop @ Geneva International Motor Show	Geneva, Switzerland	Close link to Geneva Motor Show	
26-30 May 2013	60th UITP World Congress and Mobility & City Transport Exhibition	Geneva, Switzerland	- Smart city and mobility management - The tools of Mobility 2.0 - Business models for urban mobility Deadline call for paper: 30/03/12	
June 2013	ITS in Europe Congress	Dublin, Ireland	The theme will be “Delivering for European Competitiveness through Sustainable Mobility”. The Congress is the major ITS event in Europe, with several thousand delegates from the continent and beyond gathering in the Irish capital to discuss	

			and showcase the latest transport solutions. The main topics will be: – Connecting ITS to the people (information systems) – Cooperative mobility – Interoperability – Demand management – More efficient travel (for people and goods) – Safer Travel – Facilitating modal shift	
First half 2013	Future Internet Assembly 2013	TBC	Collaboration between Future Internet projects to strengthen European activities and permit interactions and cross-fertilisation across technical domains. Bi-annual event	
Second half 2013	Future Internet Assembly 2013	TBC	Collaboration between Future Internet projects to strengthen European activities and permit interactions and cross-fertilisation across technical domains. Bi-annual event	

11. Annex IV – ATAC press coverage FI-PPP Event Barcelona