ICT cloud-based platform and mobility services available, universal and safe for all users

D2.3 Mobility Requirements Refined Version

Deliverable Id :	**D2.3**
Deliverable Name :	**Mobility Requirements Refined Version**
Status :	**Final**
Dissemination Level :	**PU**
Due date of deliverable :	**M11**
Actual submission date :	**M13**
Work Package :	**WP2**
Organization name of lead contractor for this deliverable :	**Empresa Municipal de Transportes de Madrid S.A.**
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Abstract: This document is focused on refining, for the three pilot cities, the detailed requirements on infrastructure, public transport management and final users.

HISTORY

Version	Date	Modification reason	Modified by
0.1	12/08/2014	Draft version	Cristina Beltran and Beatriz Garcia (SICE)
0.2	12/09/2014	First draft Madrid pilot and annexes for Madrid pilot	Sergio Fernández and Mario González (EMT)
0.3	24/09/2014	Contribution from Tampere pilot;	Angelica Nieto (TUT)
0.4	29/09/2014	Conclusions from Madrid and Tampere pilots	Cristina Beltran (SICE), Angelica Nieto (TUT)
0.5	30/09/2014	Contribution from Genoa pilot	Vittorio Saettone (CDG), Michele Masnata (SOF), Marco Troglia (QRY)
0.6	16/10/2014	Review	Marco Troglia (QRY)
0.9	24/10/2014	Quality Check	Sergio Fernández (EMT), Susana Palomares (ATOS), Cristina Beltran (SICE)
FINAL	24/10/2014	Final Version	ATOS

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List of Abreviations

<Abbreviation>	<Explanation>
AMT	Azienda Municipale Trasporti
App	Application
ATP	Azienda Trasporti Provinciali
BT	Bluetooth
D	Deliverable
DB	Data Base
EE	Energy Efficiency
ESS	Exploitation Support System
GIS	Geographic Information System
GPS	Global Positioning System
GTFS	General Transit Feed Specification
GUI	Graphical User Interface
ICT	Information and Communication Technology
I/C/A/Vp	Incentives, Coupons, Advertisement, Vouchers provision
IP	Internet protocol
ITS	Intelligent Transport System
LL	Living Lab
LTC	Local Traffic Controller
MAC	Media Access Control
MJP	Multi Journey Planner
OBU	On Board Unit
PCBox	Personal Computer Box
PLC	Power Lane Communication
RADAR	Radio Detection and Ranging
SW	Software

T	Task
UC	Use Case
UT	User Type
UTC	Urban Traffic Control
WP	Work Package
24/7	24 hours a day 7 days a week
3G	Third Generation
4G	Fourth Generation

Executive Summary

This deliverable is aimed at providing a refined version of the mobility requirements already identified and described in chapter 4 of Deliverable D2.1.

The revision of requirements has been done taking into consideration different aspects, including:

- Feedback provided by -anonymous- users and stakeholders through the questionnaires launched locally at the pilot cities;

- Feedback provided by users and/or stakeholders and gathered at the Living Lab activities held at each pilot city;

- The preliminary results of the specification of MoveUs common services and the city specific services carried out in deliverable D3.3.

It is to highlight that the official materials for the organization of the Living Labs were not available before the submission deadline of this deliverable; therefore, the inputs to service requirements from the Living Labs participants at each pilot site will be considered and analyzed at the design and / or implementation of the platform and services stages.

In the following sections, for each pilot city (Madrid, Genoa, Tampere) the different use cases are briefly reviewed and the correspondent mobility requirements are reviewed and refined by correcting, adding and/or deleting entries so as to obtain a definitive and refined version of mobility requirements collected in specific tables for each use case.

Also, a revision of the requirements and specification of the incentives schema is provided in a specific section, based on the description of the functionalities related to the provision of incentives, coupons, advertisement and vouchers made and reported in deliverable D3.3.

In Annexes attached to this document, detailed information about the feedback collected for task T2.2 from external stakeholders and final users from the three city pilots is provided; such feedback has been used to support the refinement of the mobility requirements.

1 Introduction

This Deliverable D2.3 is the third and last deliverable expected for **WP2 – User requirements and current infrastructures.**

The **objectives** of WP2 are:

- To identify the currently deployed mobile technologies, devices, networking infrastructures and platforms with a special emphasis in the piloting cities
- To identify stakeholders and end-users' needs and requirements in order to define the necessary features and functions of the MoveUs platform and its associated services
- To create and analyze an initial set of potential MoveUs services usage scenarios, and identify those with highest priority that could serve as reference implementations in the living labs and city pilots.
- To provide more detailed specifications for the city pilots, clearly identifying the similarities and differences between them.
- To define energy-efficiency mobility rules and packages of incentives related to them
- To identify the information sources and sinks in cities, focusing especially in the pilot test cities, and assess the quality of the data available in terms of accuracy, usefulness, reliability, latency, etc.

To achieve these objectives, **WP2 is divided in five tasks**, as follows:

- **T2.1**: Analysis of mobile technologies, devices, networking infrastructures and platforms, and description of current interaction modes with the user
- **T2.2**: Mobility requirements: Including infrastructure requirements, public transport management requirements and final users' requirements
- **T2.3**: Identification of mobility and users' information sources and sinks for each piloting city
- **T2.4**: Incentives-based model concept
- **T2.5**: Use cases and common specifications for the pilots

This Deliverable describes the final outcomes of the task T2.2 that includes the revision and refinement of the mobility requirements identified and defined in previous stages of task T2.2 and reported in chapter 4 of deliverable D2.1 Current infrastructures, mobility requirements and information sources already submitted.

Task and Key Objectives	Reference
Task 2.2: To review and refine mobility requirements from the user and the stakeholders' point of view based on the information and feedback gathered in each piloting city (Madrid, Genoa, Tampere).	• Chapter 1 • Details in Annex 1, Annex 2 and Annex 3

2 Mobility requirements of services: refined version

This section provides a refined version of the mobility requirements that had been identified in chapter 4 of the deliverable D2.1.

2.1 Madrid pilot site

2.1.1 Brief description of use cases

2.1.1.1 Description of the UC1: Smart prioritization of vehicles

The objective of this service is to give priority to specific vehicles in crossings controlled by traffic lights from the Urban Traffic Control System operating in Madrid, so as to optimize the time of travel and the travel efficiency of those modes of transport.

In principle, priority will be assigned only to public buses and upon request in the case the bus is delayed in its route.

The delayed bus will request priority for the upcoming crossing to MoveUs that will manage all the priority requests received and will communicate with the Local Traffic Controller (LTC) needed.

The traffic controller will trigger the micro-regulation action at the crossing (local action) whenever a request for priority is received from MoveUs and the traffic conditions allow for it.

Requirements from the public transportation management and the traffic infrastructure apply in this use case.

2.1.1.2 Description of the UC2a: Smart routing for pedestrian

This service aims to provide pedestrians with the smartest route between their actual position and a selected destination following the mobility preferences recorded at the registration phase.

Among the smartest options -and the respective incentives related to them- offered by this service, the users can choose the way they want to move: public transport, public bike, on foot, etc. and the application will guide the user to achieve the target point.

The mobility options provided by MoveUs platform to the user will take into account the mobility information available in MoveUs platform, including public bus stops and lines, public bike stations and availability, location of smart crossings for pedestrian, traffic incidents and congestions, travel times by each transport mode,

etc., and the credits related to each route option, to support the creation of the smartest route.

Requirements from the public transportation management, the transport infrastructure and the final user apply in this use case.

2.1.1.3 Description of the UC2b: Smart crossing for pedestrian

This service aims to provide the smartest crossing options to the pedestrians.

This service will support the user in its route in order to cross safely, both in those crossings implemented with a camera-based system (SafeCross system) to detect pedestrian crossing and that extends the green time until it has crossed safely or until a maximum pre-programmed time is exceeded, and by applying a reaffirmation of a demand.

When the user arrives to a smart crossing, this service will detect the Bluetooth MAC of the user's personal device and the smartphone application will allow him to reaffirm the demand of crossing.

MoveUs will be informed of the detection of the user and will receive the reaffirmation of crossing demand from the user that will be communicated to the respective LTC.

This service will also inform users reaching a smart crossing where a SafeCross System is installed. Requirements from the traffic infrastructure and the final user apply in this use case.

2.1.1.4 Description of the UC3: Eco-efficient route planning and traffic prediction

This service is aimed at providing car users with on-trip eco-routing and re-routing options, along with privileged mobility information like on-trip advanced traffic information and automatic incident warning.

This service may be considered as a premium service offered to travellers that better fit to the city councils mobility strategies, or as an incentive to reward and/or foster eco-friendly mobility patterns.

One of the main problems happening in an urban traffic environment is the ability to provide users (travellers and drivers) with reliable times of travel information, due to the influence caused by the traffic light control strategies over the traffic.

All the information obtained from loops detectors, BT readers, traffic plans information, etc. will be integrated and computed in MoveUs so as to obtain more reliable times of travel for the different sections of the street network. Based on the times of travel for the different sections of the road network, this service is aimed at providing users with optimized routes for their mobility needs. Requirements from the traffic infrastructure and the final user apply in this use case.

2.1.2 Refined requirements of the UC1: Smart prioritization of vehicles. Refined version

The requirements of UC1 are not affected by the results of the questionnaires. According to those results, there is not much interest in the vehicle prioritization (over 50%) although this is in contrast with the results of other question that shows pretty well the interest of users in the accuracy of frequency of the buses (see annex 1).

It is also to note that the majority of the responses prefer the prioritization service to not involve an additional cost in any of its modalities. This point does not affect the initial requirements either.

Therefore, the final requirements would be:

ID	General Requirement definition	Specific Requirement definition	System/subsystem/ module or component	Consideration
M_S1_FR_01	Every priority vehicle should have an OBU implemented and able to communicate with MoveUs platform.	The IP addresses from the OBUs should be fixed and previously configured in MoveUs.	- ESS of public bus / On Board Unit (OBU).	
M_S1_FR_02	Every LTC should be able to communicate to MoveUs.	The IP addresses from the LTCs should be fixed and pre-configured in MoveUs.		
M_S1_FR_03	The topology (influence zones, permitted turns, stop lines, crossing identification and location, etc.) of the intersection with prioritization system implemented must be defined particularly for every	The topology information of the intersections implemented with prioritization system must be defined previous to the provision of the service, and uploaded and updated in MoveUs platform. Such information must be communicated from MoveUs to the ESS system of the public bus before the start of the service.	- UTC system / Local traffic controller (LTC).	

	crossing considered in the pilot, and uploaded to MoveUs.	The detection points/zone must be located at a distance from the traffic light enough for the LTC to activate priority upon request receiving, avoiding the vehicle to stop as much as possible.	- UTC system / LTC.	
M_S1_FR_04	The information provided should be using "open" standard communication protocols.	The information between the UTC/LTC, MoveUs and the OBU/ESS should be provided using "open" standard communication protocols.	- UTC system / LTC.	
M_S1_FR_05	The static information related to the public bus operation service must be pre-configurated in MoveUs from the ESS system.	Information about bus lines & routes, bus identification codes, etc. should be pre-configured in MoveUs.	- UTC system / LTC.	
M_S1_FR_06	Univocal identification of equipment.	Univocal identification of OBUsLTCs, etc. in MoveUs system.	- ESS system / OBU.	
M_S1_FR_07	Automatic updating of configuration tables.	Tables of configuration in MoveUs should be automatically updated with new static information either from the ESS system or the UTC system (i.e. changes in bus lines routes, changes in street directions, etc.).	- ESS system.	
M_S1_FR_08	On-time and fast information flow.	On-time and fast information flow must be guaranteed, as time is especially a critical aspect in this service.	- MoveUs platform.	

M_S1_FR_09	Definition of different levels of priority.	Different levels of priority will be defined by the ESS system and communicated to the LTC by MoveUs, in order to assess and decide on the traffic light control strategy to take in the crossing when more than one priority vehicle coincide.	- UTC system.	
M_S1_FR_10	Readjustment of the traffic light cycle.	If the UTC- system detects that the regular circulation characteristics have been highly modified by the prioritization actions and need re-adjustment, it will be able to directly send a signal to the LTC and force the reestablishment of the traffic light cycle.	- MoveUs platform. - ESS system / OBU.	
M_S1_FR_11	Communication language with the final user.	Language of communication with the vehicle driver will be the national language, but English will be also always enabled.	- MoveUs platform.	
M_S1_FR_12	Display of information to bus driver.	Bus driver will get information through the OBU. This information may be displayed in the device screen or be an audio message.	- ESS of public bus / OBU.	
M_S1_FR_13	24/7 Operation.	The prioritization service is able to work 24 hours, 7 days a week.	- UTC system / LTC.	

Table 1 Madrid service 1: Smart prioritization of vehicles

2.1.3 Refined requirements of the UC2a: Smart routing for pedestrian

According to the results of the questionnaires, this service has been positively valued by the interviewees. The requirements would be affected by them either; What is more, some of them would be reinforced taking into account the results of the questionnaires. Especially it is very relevant that the 86% of users have a Smartphone and that, in addition, 75% of users make use of mobile applications related with mobility, what undoubtedly would ease the use of the services in UC2a.

Again, it is to note that 90% of users are not willing to pay for the services in UC2a and therefore, the information available in the platform should come from free information sources.

Taking all this into account, the final requirements would be the following:

ID	General Requirement definition	Specific Requirement definition	System/subsystem/ module or component	Consideration
M_S2a_FR_01	Registration of personal data.	Users must provide specific set of personal data in order to use all the functionalities of this service; if no personal data are provided, only a very limited set of functionalities will be enabled for the user.	- Personal device. - MoveUs platform	
.				
M_S2a_FR_02	3G/4G data communication.	It is used to transmit information between the personal device and MoveUs in both directions.	- Personal device. - MoveUs platform. - Communication network.	
M_S2a_FR_03	GPS enabled and activated in the personal device.	A GPS-enabled personal device is needed to locate and possibly track users.	- Personal device.	

M_S2a_FR_04	Points of interest database in MoveUs.	A list of points of interest will be available in MoveUs; MoveUs should be able to route users to them if desired.	- MoveUs database.	
M_S2a_FR_05	User's information database.	Database inside MoveUs with user's mobility behaviour only if the user opts-in; MoveUs will be able to track the mobility options taken by the user with the previous consent of the user.	- MoveUs database.	
M_S2a_FR_06	Smart mobility options provision.	MoveUs must be able to provide with several smart mobility options (public bike hiring, public transport, private vehicle, etc).	- MoveUs platform.	
M_S2a_FR_07	User identification and information selection.	Information provision to the user based on the preferences indicated by the user (at the moment of the routing request or by default taken from the user –preferences- profile).	- Personal device's MAC. - User profile database at MoveUs.	
M_S2a_FR_08	Univocal identification of the personal device.	Each user profile will be related to a personal device MAC.	- Personal device's MAC. - User Information Database at MoveUs platform.	
M_S2a_FR_09	Route generator application.	Application generates a smart route taking user's GPS position as origin and coordinates of the target point or point of interest selected by the user.	- Personal deviceGPS system.	

Table 2 Madrid service 2a: Smart routing for pedestrian

2.1.4 Refined requirements of the UC2b: Smart crossing for pedestrian

This functionality is also considered as very useful by the interviewees, although in this case there is quite similarity among users that consider it useful (56%) or not (44%). It must be taken into account that this functionality is addressing especially groups of reduced mobility among which there are a high number of elder people and only 2% of interviewees are in that age range.

Here again the fact that the majority of interviewees have a smartphone and use mobile applications would benefit the future use of this service, although it is also to consider their unwillingness to pay per using it.

In this case, the requirements will not change and would be the following:

ID	General Requirement definition	Specific Requirement definition	System/subsystem/ module or component	Consideration
M_S2b_FR_01	Registration of personal data.	Users must provide specific set of personal data in order to use this service.	- Personal device. - MoveUs platform.	
M_S2b_FR_02	Smart crossings database available in MoveUs.	MoveUs must have a list of smart crossings in the city.	- Smart Crossings operator. - MoveUs Platform.	
M_S2b_FR_03	GPS enabled and activated in the personal device.	A GPS-enabled personal device is needed to locate and possibly track users.	- Personal device.	
M_S3a_FR_04	BT enabled and activated in the personal device.	In order to make use of this service the BT of users' personal devices must be enabled and active.	- Personal device.	
M_S2b_FR_05	Location of BT detectors at the smart intersections.	The power autonomy of the BT readers is limited; therefore, the devices should be located in the traffic light posts where electricity power	- BT receptor.	

		supply is be guaranteed. Also, the coverage area of the BT readers for the detection of MACs of the personal devices is limited; therefore, the location of BT readers should guarantee full coverage in the intersection area where they will be deployed.		
M_S2b_FR_06	Capacity of filtering raw data by the BT detectors.	The BT detectors will be able to filter data obtained and to discard data which are incomplete, erroneous, noisy, etc.	- BT detector network.	
M_S2b_FR_07	Automatic extension of crossing time for pedestrian.	A number of selected crossings in Madrid pilot will be implemented with specific system to enable a safe crossing for pedestrian by extending the time for crossing whenever a pedestrian is detected at the zebra crossing.	- LTC/PCBox. - SafeCross camera and detection SW.	
M_S2b_FR_08	Accurate location of the pedestrian.	The system must be able to accurately locate the pedestrian at the intersection so that the personal device communicates with the BT reader and thus with the LTC of the traffic light that controls the crossing of interest for the user.	- BT receptor - LTC/PCBox	
M_S2b_FR_09	Reliability of detection SW.	The SW of the camera-based detection system must be able to accurately detect and confirm that a pedestrian is crossing.	- Video camera. - Algorithmic detection and SW. - LTC.	

M_S2b_FR_11	24/7 operation.	Smart crossing should be in operation 24 hours a day, 7 days a week.	- All systems are involved.	
M_S2b_FR_12	Camera location.	The coverage of the camera for the detection of pedestrian crossing is limited; therefore, the location of the cameras should guarantee full coverage in the intersection area where they will be deployed. To avoid vandalism equipment should be located in a not easy to reach and not easy to see location.	- Camera equipment.	
M_S2b_FR_13	Pedestrian detection at the zebra crossing.	It may need that the camera registers any crossing pedestrian, regardless of subsequent actions.	- Camera. - PCBox.	
M_S2b_FR_14	Univocal identification of equipment.	The univocal identification of equipment is needed for the BT readers, PCBox, Safecross cameras, etc. and also for the personal device, which BT MAC will be associated with a user profile in MoveUs platform.	- Camera system equipment. - Traffic light / LTC. - BT receptor. - Personal device MAC.	
M_S2b_FR_15	Communication language.	Language of communication will be English, but translation to local languages will be enabled.	-Personal device.	

Table 3 Madrid service 2b: Smart crossing for pedestrian

2.1.5 Refined requirements of the UC3: Eco-efficient route planning an traffic prediction

This use case has been very positively valued by the interviewees with 44% of users that consider it very useful. As in the previous use case, a smartphone is needed for this service, and the high percentage of mobile phone users benefits the future of this service. Also, as in the previous cases, there is not willingness to pay per use of this service but in a lower percentage that the others, due to the fact that in this use case there may be a clear time and/or fuel consumption saving for the user.

It is also to note that the results of the questionnaires show a clear motivation with the use of incentives (economic ones above all), and, if this service is offered as an incentive, then it may be well accepted by the users.

The requirements will not be affected by the results of the questionnaires, and therefore, they will be the following:

ID	General Requirement definition	Specific Requirement definition	System/subsystem/ module or component	Consideration
M_S3_FR_01	Registration of personal data.	Users must provide specific set of personal data in order to use this service.	-Personal device. - MoveUs platform.	
M_S3_FR_02	Location of BT detectors along the urban roads.	The power autonomy of the BT readers is limited; therefore, the devices should be located in places where electricity power supply will be guaranteed (lampposts, Information panels in the street, RADAR cameras posts, etc.). Also, the coverage area of the BT readers for the detection of MACs is limited; therefore, the location of BT readers should guarantee full coverage in the road section where they will be deployed.	- BT detector network.	
M_S3_FR_03	Capacity of filtering raw data by the BT detectors.	The BT detectors will be able to filter data obtained and to discard data which are	- BT detector network.	

		incomplete, erroneous, noisy, etc.		
M_S3_FR_04	Accurate location of the user.	The technology used to locate the user (mobile phone GPS) should be accurate in order to provide reliable routes to the user.	- GPS system in the personal device.	
M_S3_FR_05	Calculation of reliable times of travel per road sections.	The times of travel will be calculated in relation to specific road sections, divided by following criteria like topology, operation characteristics, etc. The division of sections may not be similar to that used by the different data providers, and will not necessary keep a constant length.	- UTC system. - BT detectors network. - MoveUs system.	
M_S3_FR_06	Automatic re-routing information provision.	Once a traffic event is detected by MoveUs that significantly impacts the route provided to the user, the application will automatically inform the user about the event and will offer the possibility to calculate an alternative route.	- Personal device. - Eco-efficient routing application. - MoveUs system.	
M_S3_FR_07	User preferences database updating.	Users' preferences and mobility behaviour can be registered in MoveUs platform as an opt-in option for the user.	- Users preferences database in MoveUs platform.	
M_S3_FR_08	Synchronization of incentives and user behaviour databases.	The mobility options selected and followed by the usershould be tracked for the provision of the related incentives. User tracking will be and opt-in option for the user.	- Incentives database in MoveUs. - Users preferences database in MoveUs.	
M_S3_FR_09	Univocal identification of equipment.	The univocal identification of equipment is needed for the BT readers and LTCs in MoveUs system, including the personal device, which BT MAC will be associated with a user profile in MoveUs platform.	- Personal devices. - LTC. - BT detectors. - MoveUs platform.	

M_S3_FR_010	Communication language.	Language of communication will be English, but translation to local languages will be enabled.	- Personal device.	
M_S3_FR_11	24/7 Operation.	The eco-efficient routing service will work 24 hours a day, 7 days a week.	- UTC- system / LTC. - BT detectors network - MoveUs system.	
M_S3_FR_12	Graphical display of route information to final user.	Routes will be displayed on the personal device registered by the user and over a GIS based map (preferably Google Maps)	- Personal device. - Users database in application developer server.	

Table 4 Madrid service 3: Eco-efficient route planning and traffic prediction

2.2 Genoa pilot site

2.2.1 Brief description of use cases

During the past months, the Genoa services were redefined by gathering a list of ideas by Mobility Department and stakeholders. Agreements with third parties such as the Local Public Transport Operator and the Province of Genoa were established and efforts were concentrated in these three subsystems to verify their potential impacts on requirements:

- **Air Sensors**
  The acquisition of data about pollutant emissions is achieved with monitoring stations (SO2, CO, O3, NO2, C6H6, PM10). The data is acquired by the Province of Genoa, which shall transfer to the City, according to an agreement, a Database called "Traffic - Environment". Data are acquired every 24 hours. There are a total of 11 sensors in the territory of Genoa. All the bureaucratic and informatics procedures are in place.

- **SIMON**
  SIMON is the system for monitoring the Fleet provided by AMT SpA, Public Transport operator of the city of Genoa. Data is exchanged using the GTFS protocol. General Transit Feed Specification (GTFS) defines a common format for public transportation schedules and associated geographic information. The GTFS archive is composed by a set of files focused on transit information: stops, routes, trips, and other schedule data. Also for this subsystem all the necessary work has been completed.

- **Local Journey Planner**
  The Mobility Department undertook major preparatory work with Province of Genoa and its technical partner Datasiel to integrate the Local Journey Planner. The **Local Journey Planner** includes all the stops used by the companies that operate the local public transportation service on a regional scale as well as many Trenitalia railway stations in Italy and the regional Genova-Casella narrow-gauge railway line. There are about 9000 stops in Liguria and around a thousand railway stations. The system includes timetables for local public transport on rails (trains and subways) and on wheels (urban and suburban and buses) supplied by Ligurian transport operators and by Trenitalia, that have collaborated in order to achieve this result. In the final implementation there will be information on Public Transport Companies such as:
    - AMT (Genoa)
    - ATC (La Spezia)
    - Riviera Trasporti (Sanremo and Imperia)
    - Tigullio Trasporti (Chiavari and Tigullio district)
    - ACTS (Savona)
    - ATP-Azienda Trasporti Provinciali (Province of Genoa)
    - SAR (Albenga and Finale district

The system includes the timetables of the following companies:

- **Trenitalia** that includes the entire regional railway service;
- **AMT** that covers the entire territory of the municipality of Genoa;
- the railway service in concession **Ferrovia Genova-Casella;**
- **ATC** that covers the province of La Spezia and some municipalities of the Lunigiana area;
- **Riviera Trasporti** that covers the entire province of Imperia;
- **ATP** Autolinee Provinciali that covers the entire province of Genoa, suburbs and out-of-town areas;
- **ACTS** that covers the entire territory of Savona, and urban area of Savona;
- **SAR** that covers the Western province of Savona, the area of Finale Ligure and Albenga area.

All Bureaucratic procedures regarding Local Journey Planner are in progress.

It's very important to underline the fact that stakeholders engagement and living labs' activity started recently. In fact the kick-off of Genoa's Living Labs was held on 24th September. This means that stakeholders had made little contribution to the redefinition of requirements.

The department is experimenting for the first time the LL methodology with 13 heterogeneous group of stakeholders such as AMT S.p.a, Genova Parcheggi, City Park Genova, Liguria Trenitalia S.p.a., Local Civil Protection, Porto Antico S.p.a., local pedestrians' association and many others.

Genoa's approach allows all involved stakeholders to concurrently consider the main features of the two services and its potential adoption by users. The stakeholders will be involved in the co-creation, exploration, experimentation and evaluation of innovative ideas, scenarios and concepts.

2.2.1.1 Description of UC1: Personal multi-modal journey planner with energy calculator

The first service is an application expected to allow users to fulfil all personal mobility needs in an urban environment; "Personal mobility needs" are to be understood in a broad sense, and include not only aspects related to the travels themselves but also to personal needs such as point of interests, shops, hobbies, etc. The service will provide results in terms of criteria chosen such as time of travel, cost, energy consumption, carbon footprint, incentives, personal needs, etc.

2.2.1.2 Description of UC2: Integration of crowd sourced data into the Genoa traffic supervisor

The second service is built over the integration of crowd sourced data provided by users through mobile devices (smartphone, phablet, tablet) with traffic supervisor. Thanks to MoveUs, this service will make users to become both consumers and producers of data, a mixed role, referred to as prosumer. Additionally, managers of mobility department, being part of the platform, will receive data generated by the citizens so they can be involved quickly in addressing the city' demands.

2.2.2 Refined requirements of the UC1: Personal multi-modal journey planner with energy calculator, incentives & rewards management and electronic wallet functionalities

The living lab activities have not been started yet, because the materials for living labs have not yet been finalized by the WP leader. However, the multimodal journey planner service has been discussed with stakeholders and, considering the modifications introduced foe the Incentives, Coupons, Advertisement, Vouchers provision (I/C/A/Vp) use case, the final requirements are as follows:

ID	General Requirement definition	Specific Requirement definition	System/subsystem/module or component	Consideration
G_S1_FR_01	Get Information on Schedules	Real time and fast information flow must be assured, as time is a critical aspect in this sub-service; results shall be available to user within seconds.	CO-Cities or Liguria Region journey planner Remark: CO-Cities and the Region of Liguria have develop a multimodal journey planner	The input could be to write the starting and end position or picking the places from a map. Note: All the bureaucratic procedures regarding Liguria Region Journey Planner are in progress.
G_S1_FR_02	Get Information on Events	Information must be pre-configured in MoveUs and timely updated; results shall be available to user within seconds.	Connection to proper datasets: 1) Traffic message (real time and scheduled) provided by Traffic Supervisor; 2) Events' Agenda data provided by Local Tourism	

			Department. 3) Data provided by MoveUs service 2	
G_S1_FR_03	Get Information on Weather Forecast	"Quasi" real time and fast information flow must be assured, as time is a critical aspect in this sub-service; results shall be available to user within seconds.	Connection to proper datasets: 1) The Weather Sensors Network can export a series of detailed information about the temperature, the humidity level, and weather in general, for 26 areas of the Municipality.	Note: All the bureaucratic procedures are in place.
G_S1_FR_04	Get Information on Environment	"Quasi" real time and fast information flow must be assured, as time is a critical aspect in this sub-service; results shall be available to user within seconds	Connection to proper datasets 1) Air Sensors provided by the Province of Genoa	Note: All the bureaucratic procedures are in place.
G_S1_FR_05	Get Information on traffic	Real time and fast information flow must be assured, as time is a critical aspect in this sub-service	Connection to proper system: CO-Cities or Liguria Region journey planner or Google Traffic (only Google Maps Traffic Layer)	Note: All the bureaucratic procedures regarding Liguria Region Journey Planner are in progress.
G_S1_FR_06	Get Information on Incentives	Information must be pre-configured in MoveUs and timely updated; results shall be available to user within	(I/C/A/Vp) Management	

		seconds		
G_S1_FR_07	Get Information on Coupons	Information must be pre-configured in MoveUs and timely updated; results shall be available to user within seconds	(I/C/A/Vp) Management	
G_S1_FR_08	Get Information on Personal Account	Information must be pre-configured in MoveUs and timely updated; results shall be available to user within seconds; interface shall be similar to that of Registration;	Personal Account Management	
G_S1_FR_09	Trip planning: fastest trip	Information must be pre-configured in MoveUs and timely updated; results shall be available to user within seconds	CO-Cities or Liguria Region journey planner	Note: All the bureaucratic procedures regarding Liguria Region Journey Planner are in progress.
G_S1_FR_10	Trip planning: cheapest trip	Information must be pre-configured in MoveUs and timely updated; results shall be available to user within seconds	CO-Cities or Liguria Region journey planner	Note: Trip planning: cheapest trip Information must be pre-configured in MoveUs and timely updated; results shall be available to user within seconds CO-Cities or Liguria Region journey planner Note: All the bureaucratic procedures regarding Liguria Region Journey Planner are in progress. All the bureaucratic procedures regarding Liguria

				Region Journey Planner are in progress.
G_S1_FR_11	Trip planning: trip with lowest carbon footprint	Information must be pre-configured in MoveUs and timely updated; results shall be available to user within seconds	Carbon Footprint Management	During the Kick Off of Living Labs there was a great interest on carbon footprint
G_S1_FR_12	Trip planning: trip with lowest energy consumption	Information must be pre-configured in MoveUs and timely updated; results shall be available to user within seconds	Energy Consumption Management	During the Kick Off of Living Labs there was a great interest on energy consumption
G_S1_FR_13	Trip planning: car pooling availability	Information must be pre-configured in MoveUs and timely updated; results shall be available to user within seconds	Car Pooling Management	Please Note: Car Pooling Subsystem is under evaluation.
G_S1_FR_14	Trip planning: highest incentives' gain	Information must be pre-configured in MoveUs and timely updated; results shall be available to user within seconds	Incentive Management	
G_S1_FR_15	Trip planning: Availability of Coupons	Information must be pre-configured in MoveUs and timely ; results shall be available to user within seconds	(I/C/A/Vp) Management	
G_S1_FR_16	Trip planning: based on events of interests by	Information must be pre-configured in MoveUs and timely updated; results shall be available to user within	Connection to proper datasets: 1) Traffic message (real time	

	users	seconds	and scheduled) provided by Traffic Supervisor; 2) Events' Agenda data provided by Local Tourism Department. 3) Data provided by MoveUS service 2.	
G_S1_FR_17	Trip selection	MoveUs must be notified and ready to provide timely information to users when the trip will start	Liguria Region journey planner	Note: All the bureaucratic procedures regarding Liguria Region Journey Planner are in progress.
G_S1_FR_18	On Trip Real Time Tracking	This function must be ON	Personal Account Management	Privacy Issues
G_S1_FR_19	On Trip Real Time Tracking	Accurate positioning	GPS, Wi-Fi, Mobile Network	Privacy Issues
G_S1_FR_20	On Trip Notifications	This function must be ON	Personal Account Management	
G_S1_FR_21	On Trip (only smartphone): Notifications	Real time and fast information flow must be assured, as time is a critical aspect in this sub-service; notifications shall be sent to user within seconds	> Liguria Region journey planner or Traffic Supervisor Notifications System or MoveUS Service n.2	Note: All the bureaucratic procedures regarding Liguria Region Journey Planner are in progress.

G_S1_FR_22	On Trip (only smartphone): Trip changes	Real time and fast information flow must be assured, as time is a critical aspect in this sub-service	Trip Planning	
G_S1_FR_23	On Trip and After Trip: Feedback from users	The user interface must be simple and easy to be used	CO-Cities journey planner	
G_S1_FR_24	Other: Payments/reservations	The user interface must be similar to that of home banking	Electronic Wallet Registry	Redirect to others payments/reservation systems
G_S1_FR_25	Other: Spend incentives	The user interface must be similar to that of home banking	(I/C/A/Vp) Management	
G_S1_FR_26	Other: Check personal accounts	The user interface must be similar to that of Registration	Personal Account Management	
G_S1_FR_27	Other: Interact with Users' community	Interface shall be similar to that of Social networks; it will be possible to evaluate the quality of services and of information provided by MoveUs	Social Networks Management	
G_S1_FR_28	Set Up (web+smartphone)	Enable GPS and positions recording	Connection to proper datasets	Car Sharing is under study and evaluation. Privacy Issues.
		Set up destination points	-	
G_S1_FR_29	Trip planning (web+smartphone)	Check Car sharing position (latitude, longitude) and static data; results shall be ready within seconds	Connection to proper datasets	

G_S1_FR_30	After Trip (web+smartphone)	Per selected period	Personal Account Management: car sharing balance	
G_S1_FR_31	Set Up	Enable GPS and positions recording	Connection to proper datasets	Bike Sharing is under study and evaluation. Privacy Issues.
		Set up destination points		
G_S1_FR_32	Trip planning	Check Bike sharing position (latitude, longitude) and static data; results shall be ready within seconds	Connection to proper datasets	
G_S1_FR_33	After Trip	Per selected period	> Personal Account Management: Bike sharing balance	
G_S1_FR_34	Set Up	Per each mode of mobility, information must be pre-configured in MoveUs and timely updated	Store Carbon Footprint into Carbon Footprint Database	
G_S1_FR_35	Trip planning	Per each selected trip, calculation must be done in seconds	Calculate Carbon Footprint	
G_S1_FR_36	Personal Account Management	Per selected period, calculation shall be ready in seconds	Personal Account Management: Carbon Footprint balance	
G_S1_FR_37	Set Up	Per each mode of mobility, information must be pre-configured in MoveUs and timely updated	Store Energy Consumptions into Energy Consumptions Database	

G_S1_FR_38	Trip planning	Per each selected trip, calculation must be done in seconds	Calculate Energy Consumptions	
G_S1_FR_39	Personal Account Management	Per selected period, calculation shall be ready in seconds	Personal Account Management: Energy Consumptions balance	
G_S1_FR_40	Set Up	Per each user	Store usual trips into Car Pooling Database	Please Note: Car Pooling Subsystem is under evaluation.
G_S1_FR_41	Trip planning	Per each user	Store selected trips into Car Pooling Database	
		Calculation must be done in seconds	Calculate possibility of car pooling	
		Notification must be done in seconds	Notify users on availability of car pooling	
		Car pooling must be organized in seconds	after acceptance, organize group linking together interested users	
G_S1_FR_42	Personal Account Management	Per selected period, calculation shall be ready in seconds	Personal Account Management: Car Pooling balance	
G_S1_FR_43	Set Up	Per each city	Store Rules into Rules Database	
		Per each Interested Party	Get info on Incentive and store it into Incentive	

			Database	
G_S1_FR_44	Trip planning	Per selected trip	Calculate Incentive gain	
			Notify users Incentive balance	
G_S1_FR_45	Personal Account Management	Per user	Manage transfer of incentive among users	
			Convert incentives into awards	
		Per selected period	Personal Account Management: Incentives balance	
G_S1_FR_43	Set Up	Per each city	Store Rules into Rules Database	
			Convert incentives into awards	
		Per selected period	Personal Account Management: Incentives balance	
G_S1_FR_46	Set Up	Per each Interested Party	Get info on Coupons and store it into Coupons Database	

G_S1_FR_47	Trip planning	Per selected trip	Notify users Coupons availability	
G_S1_FR_48	After Trip	Per user	Electronic Wallet Registry: Purchase/use Coupons through Voucher provision	
G_S1_FR_49	Personal Account Management	Per selected period	Personal Account Management: I/C/A/Vp Statistics	
G_S1_FR_50	Always available on web and smartphone (Pre-trip, on trip, after trip)	Per user	An update registry of I/C/A/Vp systems	Gateway to other payment systems
G_S1_FR_51	Always available on web and smartphone (Pre-trip, on trip, after trip)	Per user	An update registry of ticketing systems	
G_S1_FR_52	Always available on web and smartphone (Pre-trip, on trip, after trip)	Per user	An update registry of interested party for incentive conversion	
G_S1_FR_5	Web site	Type	Dynamic	

3		Browser	Chrome, Firefox, Explorer (optional: Safari, Opera)	
		Content Management (CM)	Text, audio, video	
		User restricted area	same as smartphone functions, as described below	
		User data management		
G_S1_FR_54	Smartphone app (only smartphone)	Operating systems	Google Android	
		Accurate positioning	GPS, Wi-Fi, Mobile Network	
		Connectivity	GSM/GPRS, dual band (optional: quad band)	
G_S1_FR_55	Registration	On line activity	Automatic or activated by user	
		Personal data (all except info on financial institutions)	Available offline and uploaded into web CM	Data Security Issues
		Personal data on financial institutions	Available only offline	Data Security Issues
		Notifications (push)	On or OFF	
		Real time tracking	On or OFF	
G_S1_FR_56	Personal Account Management	Changes in Personal data	Registration	
		Statistics on mobility	Liguria Region journey	Note: All the bureaucratic procedures regarding Liguria

			planner	Region Journey Planner are in progress.
		Carbon Footprint balance	Carbon Footprint Management	
		Energy Consumptions balance	Energy Consumption Management	
		Incentives balance	Incentive Management	
		I/C/A/Vp statistics	I/C/A/Vp Management	
		Electronic Registry statistics	Electronic Registry Management	
G_S1_FR_57		Car Pooling usage	Car Pooling Management	Please Note: Car Pooling Subsystem is under evaluation.
G_S1_FR_58	Establish relationships among users	User interface lust be similar to that of Social Networks	Gateway to Social Networks	

Table 5 Genoa service 1: Personal multi-modal journey planner with energy calculator, incentives & rewards management and electronic wallet functionalities

2.2.3 Refined requirements of the UC2: Integration of crowd sourced data into the Genoa traffic supervisor

The living lab activities have not been started yet, because the materials for living labs have not yet been finalized by the WP leader. However, the multimodal journey planner service has been discussed with stakeholders, and the requirements are as follows:

ID	General Requirement definition	Specific Requirement definition	System/subsystem/ module or component	Consideration
G_S2_FR_01	Smartphone app (only smartphone)	Operating systems	Google Android	
		Accurate positioning	GPS, Wi-Fi, Mobile Network	
		Connectivity	GSM/GPRS, dual band (optional: quad band)	
G_S1_FR_02	Set up	Check personal accounts	Personal Account Management	
		Enable GPS and positions recording	GPS System	
G_S1_FR_03	Personal Account Management	Real Time Feedback	Personal Account Management	
G_S1_FR_04	After Trip	Real Time Feedback	Social Network Management	
		Interact with Users' community	Ranking evaluation of the service	
G_S1_FR_0	Data security and privacy			

5	assurance			
G_S1_FR_06	Incentives to participations			

Table 6 Genoa service 2: Integration of crowd sourced data into the Genoa traffic supervisor

2.3 Tampere pilot site

2.3.1 Brief description of use cases

2.3.1.1 Description of the UC1: Calculation of Multimodal Journey Options

This service aims to offer the user the possibility to see all available mobility (i.e. bus/car/bike/pedestrian) and routing (streets and pathways) options between its current location and a declared intended destination.

The users can choose the way they want to move: public transport, bicycle, city bicycle (hired bike) or on foot, and the application will guide the user to achieve the target point.

The mobility options provided by MoveUs platform to the user will take into account the mobility information available in MoveUs platform, including bus stops and lines, city bike stands, bicycle parking places and car parking place and availability.

2.3.1.2 Description of the UC2: Energy efficiency / CO2 assessment of journey options

This service aims to assess the energy efficiency and / or CO2 cost of input journey (i.e. mobility & routing) options between a source and a destination point, per user.

The carbon footprint of each journey option will be displayed to the user in the multi-modal journey planner next to each journey option, in an easy-to-understand way.

2.3.1.3 Description of the UC3: User-tailored incentive-based visualization service

This service aims to give an incentive oriented view of input transportation options information, per user. It acts as an adaptor for user-friendly meaningful display of backend computed information.

In MoveUs, for the Tampere pilot, this service targets the mapping of EE/CO2 labels to incentive points (and subsequently relevant incentives) for the user considered, based on a set of incentive rules stored in a dedicated DB.

2.3.1.4 Description of the UC4: Location of Parking Places

This service requests to parking sub-service for the location of parking places close to the destination of the user.

This service will be used if the user decides to use a car as a journey option. The service will display the closest parking facilities to the end-point of the journey and their availability.

2.3.2 Refined requirements of the UC1: Calculation of Multimodal Journey Options

The living lab activities have not been started yet, because the materials for living labs have not yet been finalized by the WP leader. However, the multimodal journey planner service has been discussed with stakeholders, and the requirements are as follows:

ID	General Requirement definition	Specific Requirement definition	System/subsystem/ module or component	Consideration
T_S1_FR_01	Required inputs to multimodal journey planner service.	Computation of the GPS position of the user must be enabled or the user must be pinpointed to indicate his start location on a map.	Multimodal Journey Planner	The input could be to write the starting and end position or picking the places from a map
T_S1_FR_02	Criteria for searching journey options	Must be able to embed search criteria into the request to find journey options.	Multimodal Journey Planner / Car Journey Planner	Search criteria e.g. fastest, least number of traffic lights, avoid traffic jams, etc.
T_S1_FR_03	Accuracy of journey options assessment, per user	Real time winter road maintenance situation to be taken into account when computing available journey options between a source and a destination point, per user.	Multimodal Journey Planner (MJP)	RT winter maintenance information from maintenance

				vehicles equipped with GPS to be fed to MJP
T_S1_FR_04	Manageable computational complexity	All available journey options must be displayed within seconds from the initiation of user request.	Multimodal Journey Planner	
T_S1_FR_05	Storage of user profile data	User sensitive data must not be stored in the cloud, unless it is required input for the services requested by the user and the user agrees to the transfer of information.	ALL.	
T_S1_NFR_01	Language	Application language is English. Translate enabled.	User Interface.	irrespective of services accessed and means of access (web/smartphone app)
T_S1_NFR_02	Visualization	User-friendly GUI, EE/CO2 assessment results translated to meaningful information, per user.	User Interface. Journey Advisor. Incentive Rules DB.	'Meaningful' = incentives appealing to the user, according to a user profile

Table 7 Tampere service 1: Multimodal journey planner

2.3.3 Refined requirements of the UC2: Energy efficiency / CO2 assessment of journey options. The user can see the equivalent of energy

The living lab activities have not been started yet, because the material for living labs has not yet been finalized by the WP leader. However, the energy efficiency assessment service has been discussed with stakeholders, and the requirements are summarized in the following table. This service was seen as an important feature in guiding the user towards more sustainable means of transport.

ID	General Requirement definition	Specific Requirement definition	System/subsystem/ module or component	Consideration
T_S2_FR_01	Required inputs to energy efficiency assessment service	Inputs must include computed mobility &routing options between source and destination points, per user	Consumption Estimation Calculator	Defined in WP2. This input must be fed to the MoveUs app EE/CO2 estimation module, irrespective of the pilot.
T_S2_FR_02	Required inputs to energy efficiency assessment service	Inputs must include a set of static atomic Energy / CO2 labels, associated to lowest level granularity journey (mobility and routing) options.	Consumption Estimation Calculator	Defined in WP4.

T_S2_FR_03	Manageable computational complexity	EE/CO2 assessment must be calculated within seconds from the receiving of the journey options to label.	Consumption Estimation Calculator	
T_S2_FR_04	Historical information storage	Per user profile, EE/CO2 consumption levels associated to selected journeys must be stored for computing the periodic EE/CO2 footprints of the user.	Consumption Estimation Calculator, Journey Advisor	If the user agrees. Indirectly this requirement affects all modules: Multimodal Journey Planner options selected per user + Consumption Estimation Calculator + DB associated to the user profile
T_S2_FR_05	Accuracy of EE/CO2 assessment	Real time road and weather condition data to be taken into account in the EE/CO2 cost estimation algorithm.	Consumption Estimation Calculator	And datasets: Road weather forecasts

				&Frost heave information
T_S2_FR_06	Storage of user profile data	User sensitive data must not be stored in the cloud, unless it is required input for the services requested by the user AND the user agrees to the transfer of information.	ALL.	
T_S2_NFR_01	Language	App. Language is English. Translate enabled.	User Interface.	irrespective of services accessed and means of access (web/smartphone app)
T_S2_NFR_02	Visualization	User-friendly GUI, EE/CO2 assessment results translated to meaningful information, per user.	User Interface. Journey Advisor. Incentive Rules DB.	Meaningful' = incentives appealing to the user, according to a user profile

Table 8 Tampere service 2: Energy efficiency/CO2 assessment of journey options

2.3.4 Refined requirements of the UC3: User tailored incentive-based visualization of Journey Options

The living lab activities have not been started yet, because the material for living labs has not yet been finalized by the WP leader. However, the user tailored incentive-based visualization of journey options service has been discussed with stakeholders, and the requirements are as follows:

ID	General Requirement definition	Specific Requirement definition	System/subsystem/ module or component	Consideration
T_S3_FR_01	Required inputs for granting incentives	EE/CO2 level threshold baselines (per user) or a methodology to infer threshold baselines (per user) must be defined.	Consumption Estimation Calculator, Incentives Rules, Journey Advisor	Threshold baseline: i.e. User dependent EE/CO2 consumption levels above which incentives ought to be granted.
T_S3_FR_02	Continuous updates of the Incentives DB	Incentives must be added as soon as they are available to the DB / removed from the DB as soon as they are consumed/expired.	Incentives DB	
T_S3_FR_03	Continuous updates of the incentive rules DB	Incentive rules could be updated to impose new weights on highly sought incentives.	Incentives Rules DB.	Open to determine how it is determined what

				constitutes a highly sought incentive. This is not a primary goal of Tampere Service 3, but room for improvement after MOVEUS in this sense should be left.
T_S3_FR_04	Manageable computational complexity	Translation of EE/CO2 assessments to incentives, per user, must be processed and displayed within seconds from the receiving of the input EE/CO2 labels.	Journey Advisor, Incentive Rules DB, Incentives DB.	
T_S3_FR_05	Historical information storage	Information concerning incentives chosen / preferred by a user could be stored for fine tuning future recommendations.	Journey Advisor, Incentives DB.	If the user agrees.
T_S3_FR_06	Storage of user profile data	User sensitive data must not be stored in the cloud, unless it is required input for the services requested by the user AND the user agrees to the transfer of information.	ALL.	

T_S3_NFR_01	Language	App. Language is English. Translate enabled.	User Interface.	irrespective of services accessed and means of access (web/smartphone app)
T_S3_NFR_02	Visualization	User-friendly GUI, EE/CO2 assessment results translated to meaningful information, per user.	User Interface. Journey Advisor. Incentive Rules DB.	Meaningful' = incentives appealing to the user, according to a user profile

Table 9 Tampere service 3: User-tailored incentive-based visualization

2.3.5 Refined requirements of the UC4: Parking Place location and availability

The living lab activities have not been started yet, because the material for living labs has not yet been finalized by the WP leader. However, the parking place location and availability service has been discussed with stakeholders, and the requirements are summarized in the following table. In a previous stage of the project, this service was not included, because the multi-modal journey planner focused more on sustainable means of transport (public transport, bicycles). This service was added however after feedback from stakeholders. Knowing the location and availability of parking places can decrease the amount of car traffic in the city centre, when the users don't need to drive around in search of a parking place.

ID	General Requirement	Specific Requirement definition	System/subsystem/	Considerati

	definition		module or component	on
T_S4_FR_01	Required inputs to Parking place location Service.	Computation of the GPS position of the user must be enabled OR the user must be pinpointed to indicate his start location on a map.	Car Journey Planner	The current position is used to search for the closest parking place in the vicinity and show the number of free places
T_S4_FR_02	Criteria for searching parking options	Must be able to embed search criteria into the request to find parking options.	Car Journey Planner	Search criteria e.g. maximum distance from destination
T_S4_FR_03	Criteria of parking options displayed to the user	The user must be notified by the MoveUs app should show the current route to the selected parking place.	Car Journey Planner	Provide information of the parking place
T_S4_FR_04	Continuous updates of parking options displayed to the user	The user should be notified by the MoveUs app if one of the displayed options for parking are not available anymore	Multimodal Journey Planner + Smart Traffic Prioritization	e.g. number of free places or

				notification if the parking place if full
T_S4_FR_05	Manageable computational complexity	All available journey options must be displayed within seconds from the initiation of user request.	Car Journey Planner	
T_S4_FR_06	Storage of user profile data	User sensitive data must not be stored in the cloud, unless it is required input for the services requested by the user and the user agrees to the transfer of information.	All	
T_S4_NFR_01	Language	Appl. Language is English. Translate enabled.	User Interface.	irrespective of services accessed and means of access (web/smartphone app)
T_S4_NFR_02	Visualization	User-friendly GUI, EE/CO2 assessment results translated to meaningful information, per user.	User Interface. Journey Advisor. Incentive Rules DB.	Meaningful = incentives appealing to the user, according to a user profile

Table 10 Tampere service 4: Parking place location and availability

2.4 Incentives, Coupons, Advertisement, Vouchers provision use case description

2.4.1 Brief description of use cases

The term *Incentives* is used in MoveUs to indicate the elements and features introduced in relation to the concepts of incentives, coupons, awards, vouchers and advertisement. The conceptual model of the Incentives is introduced in the project deliverable D2.2 and can be summarized in a few points:

- The end user can gain **Incentives** based on mobility-related behaviour.
- More types of incentives and **Rules** associated to incentives can be defined.
- The user can get benefits (**Awards**) in exchange of incentives.
- In order to obtain the award, a **Voucher**entity can be used.
- Additional elements for the future financial sustainability of MoveUs are defined. These are:
    - **Coupons**
    - **Advertisement**

The use case of incentives, coupons, advertisement and vouchers provision has been reviewed in light of the results of task T3.3 and, as a consequence, the description of the management of coupons has been updated as follows: The coupons won't be obtained by means of payment types based on incentives, instead these will be paid in real money (with systems completely external to MoveUs). A voucher may be emitted by MoveUs in case the organization providing the coupon needs it. With this, the coupon is seen as a mean of future economic sustainability for MoveUs.

The following paragraph describes how the corresponding section of D2.2 on Coupons Management has been amended.

2.4.2 Coupons Management

a. <u>Provision of Coupons</u>

UT5 can provide the coupons either via a dedicated interface (UT5 external to MoveUs) or through a dedicated MoveUs service (UT5_MoveUs). This should help manage a variety of situations with internal/external providers.

b. <u>Request of information on available Coupons</u>

The user (the city service he/she uses) issues a request to the module *Information on Coupons* that retrieves the necessary data from the *Coupons* DB and returns it.

c. <u>Request of Coupons</u>

The user request goes to the *Request of Coupons* module. The module executes the following operations:

I. The details on the requested coupon are retrieved from the *Coupons* DB.
II. A request of issuing a Voucher is sent to the *Voucher Management* module[1].
III. The *Voucher Management* module creates and provides the voucher to the user.
IV. The availability of coupons in *Coupons* DB is updated according to the previous operations.
V. The *Vouchers* DB is updated with a new set of data related to the voucher that has been issued. UT5 can access the database to check the details on vouchers (e.g. check validity prior to assign a coupon).
VI. The UT5 that provided the coupon is notified about the voucher issuing for the same type of coupons.

[1]In general the vouchers for the coupons are issued directly by the user type that defines the coupons. Anyway it is foreseen the possibility for organizations that don't have a voucher issuing facility to use this function from MoveUs

3 Conclusions

This deliverable contains the refined version of the requirements of the services for the three pilot sites: Madrid, Genoa and Tampere.

The requirements identified and described in task T2.1 and reported in D2.1 have been revised and/or modified taking into account different inputs received from external stakeholders and end users by different means, including online mobility questionnaires, interviews, consultations, etc.

In addition, the requirements for the provision of incentives, coupons, advertisement and vouchers have been revised and updated from deliverable D2.2 based on the results of the task T3.3.

In the case of Madrid pilot, the results of the questionnaires for privates (end users) generally support the use cases initially proposed in MoveUs therefore the preliminary identified requisites would not require any adjustment.

From a global analysis of the results it can be derived that among the participants of the questionnaires there is a major number of users of public transport as alternative to private car.

The users of vehicles normally choose that mode of transport mainly for the time saving and comfort in the sense of individuality and availability. Those aspects are opposite to what the public transport offers thus it is difficult to change its use. Only the use of public transport would be incentivized if the cost savings is substantial.

The reticence to pay for the added value mobility services is also very significant.

In the case of Genoa, the contribution was focused on describing the current situation regarding the datasets invoked in the MoveUs platform. The progresses of the bureaucratic procedures with the Province of Genoa and Liguria Region have been also analyzed and an update on the requirements of the UC1 has been provided. The last activity, specifically, has been achieved according to the ICT context met in last months and with the inputs provided by the stakeholders during the Living Lab kick- off meeting.

In the case of Tampere, discussions about the use cases were held with stakeholders from public transport and ITS factory. Based on the discussions, the use case on city bikes and parking places were added to Tampere services, which complement the information that is provided to the user with the multimodal journey planner specified in deliverable D3.3.

The main idea of the new information is to provide the closest location of places where rented bikes can be found based on the starting position of the journey. For car users, the closest parking places with free slots are provided when the user requires this information.

The already defined use cases were supported and other adjustments were not needed.

In the case of the incentives, coupons, advertisement and vouchers provision, the design of the technical specification of the web tools foreseen for the management of these elements and carried out in task T3.3, confirmed the validity of the definitions given in deliverable D2.2. Only an amendment was introduced on a detail of the conceptual model.

4 Annex 1

4.1 MADRID

4.1.1 Results of the mobility survey to privates

4.1.1.1 General profile of survey respondents

The number of participants in the survey was 283, a number that may be considered significant enough for a survey of this type. From this sample these are the following objective data:

- 50% of respondents are in the age range of 31-45 years.

- 86% of respondents have a Smartphone.

- 75% of respondents have higher annual income than 18,000 euro.

Regarding the frequency of mobility, approximately 75% makes over 15 trips within two weeks, with the following features:

- 34% of the aforementioned trips are not done by car, while 31% makes between 1 up to 5 of those trips.

- 90% of respondents indicated that travel time is between 10-60 minutes.

- 50% make those trips on a daily basis.

- 43% of trips are due to labour reasons, and 35% due to private/personal ones.

- The total trips split is: 30% by car, 34% by public transport, 20% walking and 10% cycling, mainly.

4.1.1.2 Respondents who use the car as their regular mean of transport

The main reasons provided by respondents were: 33% time saving, 18% for comfort and 10% costs savings.

Regarding alternatives to the car use, 35% of respondents said that they would travel on Metro (underground), 24% by bus, 14% by rail and 6% by Taxi or Bike.

When they were asked about what would motivate them to choose other means of transport rather than driving a car, the most selected answers were:

- Tax reduction 16%

- Economic incentives, in cash 15%

- Real time information 13%

- Bus punctuality 11%

- Discount vouchers 10%

- Safe cycling routes/lines 7%

Regarding how often they use an alternatively mean of transport (vs. Car), 22% answered that several times a week and 21% do so several times per month.

4.1.1.3 Respondents who do NOT use the car as their regular mean of transport

74% of the people who do not use the car regularly own a car or has one available. 82% prefer not to use it.

31% use Metro as the usual mode of transport while 22% use bus, 16% walking, 12% cycling and 9% train.

The stated reasons that encourage the use of public transport are:

- Cost savings 18%

- Comfort / Availability 16%

- Time savings 15%

- Environmental reasons 13%

- Health 10%

The aforementioned alternative modes of transport are used on a very different pattern and %; between several times per week (14% of respondents) up to daily (78% of respondents).

4.1.1.4 Survey on improvements in transport use

Regarding the use of applications in order to get transport information, 75% of the respondents indicate that they use them for the following purposes:

- To get information about public transport services 41%

- To get information about car route planning 21%

- To get information about traffic conditions 15%

- To get information about multimodal transport 12%

Type of applications when tourism is the main purpose:

- To get information about public transport services 28%

- To get information about car route planning 25%

- To get information about traffic conditions 15%

- To get information about multimodal transport 11%

When asked if they would like to know the carbon footprint or the energy efficiency of their trips, 48% responded affirmatively. Of those who answered yes to the question above, 84% indicates that knowing carbon footprint or energy efficiency would motivate the choice of mean of transport.

4.1.1.5 Questions oriented to MoveUs services

- Bus priority at traffic lights. Very useful 16% Not very useful 9% Not at all 44%

  - PxS. (*). 97%
  - PxU (**). 97%

- Intelligent routing. Very useful 46% Not very useful 4%, Not at all 16%

  - PxS. (*). 90%
  - PxU (**). 90%

- Intelligent crossing. Very useful 14% Not very useful 11% Not at all 31%

  - PxS. (*). 98%
  - PxU (**). 98%

- Eco-efficient planning and traffic prediction. Very useful 44% Not very useful 4%, Not at all 15%.

  - PxS. (*). 90%
  - PxU (**). 86%

(*) Percentage of responses that would not pay for these services (by subscription).

(**) Percentage of responses that would not pay for these services based on their use.

4.1.2 Results of the survey to professionals

Due to the low number of responses, only 7, the results can not be used to obtain relevant information.