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

D3.3 MoveUs city services: Specification and design

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Abstract: The Deliverable D3.3 provides the technical specification of the MoveUs City Services suitable for the implementation in the Living Labs participating in the project. The services, based on the Use Case definition, aim at achieving and demonstrating the objectives of the project and are specified to be fully integrated within the complete MoveUs infrastructure.

HISTORY

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1.0		Quality Review & Final Version	ATOS

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List of Abbreviations

A	Anonymous access
AJAX	Asynchronous JavaScript And XML
API	Application Programming Interface
App	Application
BT	Bluetooth
BTFix	Fix Bluetooth Reader
CDN	Content Distribution Network
CF	Carbon Footprint
CO2	Carbon Dioxide
D	Deliverable
DB	Data Base
DoW	Description of Work
EC	Energy Consumption
ECSS	Energy Consumption Status and Suggestion
ESS	Exploitation Support System
EV	Electric Vehicle
G	Genoa
GPS	Global Positioning System
GSM	Global System for Mobile communications
HMI	Human Machine Interface
HTML	HyperText Markup Language
ID	Identification
iOS	iPhone/iPod/iPad Operating System
IT	Information Technology
ITS	Intelligent Transport System
JSON	JavaScript Object Notation
KPI	Key Performance Indicators

LBS	Local Based Services
LOS	Level of Service
LTC	Local Traffic Controller
LTZ	Limited Traffic Zone
MAC	Media Access Control
M	Madrid
N/A	Not applicable
O/D	Origin and Destination
OBU	On Board Unit
OS	Operative System
PC	Personal Computer
POI	Point of Interest
PT	Public Transport
RT	Real Time
T	Tampere
TISP	Traffic Information Service Provider
UC	Use Case
URL	Uniform Resource Locator
UT	User Type
UTC	Urban Traffic Control
WP	Work Package

Executive Summary

The MoveUs Project Task 3.3 provides the specifications and design for the innovative MoveUs City Services to be developed in WP6.

Focused on energy efficiency and sustainable mobility and suitable for pan-European deployment, the MoveUs city services are designed and developed to demonstrate the MoveUs concepts and to achieve the project objectives in terms of energy efficiency and sustainable mobility. Technically, the services are designed to be fully integrated within the MoveUs infrastructure and to exploit the full potential of the technological solutions applied to the cloud-based platform. On a functional level, the services are based on the use cases definition specified during the analysis phase and documented in the Deliverable D2.2 [1] as the software is expected to be the primary supporting instrument for the experimental activities to be done in the MoveUs Living Labs from which the use cases are derived.

Many other functionalities and features, of course, can be envisaged in future implementations based on the MoveUs system thanks to the flexibility and modularity of the platform. The present set of city services is especially characterized by two main aspects considered since the definition of the use cases: a) the possibility of obtaining better multi-modal information and feedback to drivers and travellers as a support for their needs and b) the exploitation of new approaches and methods that could trigger a change in the mobility behaviour (e.g. a modal shift towards a 'greener' transportation).

Starting from a urban framework, the opportunities for improving the traffic and travel information have been addressed by defining one main common Multimodal Trip Planning solution with innovative elements like the dynamic and efficient integration of data from several mobility domains like parking, as well as an enrichment of the most common and "traditional" functions with new features and tools. An innovative element introduced in this context is the possibility of dynamically enhancing the information thanks to mechanisms of crowd-sourced information provision, collection and processing.

The exploitation of new approaches and methods that could trigger a change in the mobility behaviour has been addressed with an innovative approach based on the concept of *incentive*s. Incentives are a set of material and virtual objects that help modifying the mobility behaviour to obtain a reduction of driving and/or a use of alternative modes (i.e. from private vehicle to public transportation). Incentives can be also defined as the generic 'money' that can be spent to get benefits and can be gained thanks to responsible mode and route choice or within other initiatives like road charging or access restriction management. A complete set of end user services and features (also integrated within the Multimodal Trip Planner) is designed and will be developed to demonstrate these concepts.

The definition of a number of *City-specific services* also further demonstrates the flexibility and scalability of the MoveUs system and the possibility to develop specific solutions based on the existing traffic infrastructure and management with the support of an ecosystem like MoveUs that provides an existing set of features,

facilities and solutions in terms of services and data. Here, the reduction of congestion through better management of demand and capacity is achieved through improved management tools based on real-time data from roads/streets and the opportunity offered by the MoveUs platform is represented exactly by a set of efficient instruments for retrieving, processing and manage this data.

The three Cities participating in the MoveUs Living Labs: Genoa, Madrid and Tampere have participated together in the detailed analysis of the use cases to identify the common aspects and functionalities among the group of candidate City Services so that, whenever possible, a set of unified or centralized software solutions (a unique piece of software) could be specified, realized and used in common, although the platform enables full flexibility from this point of view.

This preliminary analysis, achieved at high level and based on the information available from the use cases, was conducted in the first phase of the task T3.3 activities and resulted in the identification of a number of software components common to all cities where minor differences in terms of functionalities are present but can be dynamically managed by the logic of the software. Another set of software components, instead, has been identified to be very specific for some cities and therefore the implementation is foreseen to be achieved separately.

Following the preliminary analysis, the specification has been produced by defining first a formal methodology with instruments that could support the definition of common and specific elements and the differences; subsequently, the details of the technical specification have been produced.

The present specification is technologically neutral so that an implementation (current or future) can be achieved on different platforms and solutions and includes:

I. The definition of the visual elements and components of the user interface, for each function.
II. The definition of the behaviour, logic and algorithms and their associations to the visual elements.
III. The interactions with the MoveUs Platform APIs or services.

An introduction to performance and optimization aspects is also included.

Overall, the outcomes of the task T3.3 constitute the concrete starting point for the implementation activities of WP6.

1 Introduction

The MoveUs City Services can be seen as the subset of components of the MoveUs System that implement and provide the functionalities, facilities and services at the closest level with respect to the end user.

The City Services operate in connection with the MoveUs Cloud-based Mobility Management Platform and can then benefit from the pool of resources, services and capabilities offered by the Platform itself. This includes datasets, services, APIs, storage resources, all "building blocks" enabling the implementation and realization of flexible, sustainable and added-value services in the Living Lab Cities and at a Pan-European level in the future.

The focus is on energy efficiency and sustainable mobility to be achieved by supporting and triggering users' habit changes towards 'greener' transport modes. With the support of the MoveUs cloud-based platform, innovative concepts, techniques and functional elements are applied to popular categories of infomobility solutions like Multimodal Trip Planners and information services with the objective of:

- Raise user-awareness of the carbon footprint estimate for their mobility choices,
- Advise on the best transport combination in terms of energy efficiency and in combination with the incentive-based model.

In addition to this, the MoveUs platform supports and enables the realization of more specialized systems for intelligent monitoring, management and control of the traffic infrastructure thus leading again to better conditions in urban traffic and direct energy efficiency gains.

An interesting aspect to be considered, in addition to the implementation of the City services is the possibility to extend the MoveUs innovative approach to services already existing in the cities themselves for both the transport and traffic domain and as well as in other scenarios like culture, tourism, entertainment, etc. around a common service infrastructure and model.

In order to apply, support and enhance this aspect the present services are designed to be part of a *service layer* built in a modular way *on top* of the MoveUs cloud so that any change in data, functionalities or other features occurring at centralized level can be reflected seamlessly at this service layer with no or minor adaptations needed. In other terms, the MoveUs city services can be seen as part of a wider ecosystem (the MoveUs system) where the cloud is the enabling middleware and the service layer can grow around it.

1.1 Architectural overview and definitions

The detailed architectural specification of MoveUs will be provided in the Deliverable D3.2.1 [3] and D3.2.2 as the result of the activities of Task T3.2. Here a brief and

simplified overview of the scope of the City Services within the whole MoveUs architecture is given.

In a very simplified view, the architectural configuration can include generic or abstract nodes associated to the Cities, called "Local systems", that are the *providers* of the local data and services. These are part of the existing local transport and traffic infrastructures. The abstract node "End User Service" (the City services) is connected to these local systems through an interface (the MoveUs interface). In details the local systems expose their own interfaces and the data available through them are transformed and adapted with the MoveUs adapters according to the specification of the MoveUs data model. This gives the local data available in a format commonly known to all Traffic Information Service providers that implement the final services for the City. The number of features (and the data itself) will be typically different from a situation to another but the implementation of the software does not require specialized conversion operations for every new situation.

An interesting aspect to be considered is that the TISPs can also flexibly implement the final services with separate or common software solutions for more Cities depending on the existing differences. This situation exactly happens with most of the MoveUs city services in Genoa, Madrid and Tampere. These have similar features or are exactly the same (apart from the data). Therefore, the general implementation model for the MoveUs City Services can be based on the following criteria:

a. In case of functionalities that are common to more Cities, the data that is necessary for the specific functionality is retrieved from the locally installed MoveUs interfaces and the functionality is designed and developed in common between the Cities.
b. In case of functionalities or features that are different from a City to another, the data is retrieved (possibly again using the MoveUs interface) and the differences are managed:
    - With an appropriate logic and mechanisms within the same piece of software
    - With two or more completely different pieces of software whenever this is necessary

Depending on the local-specific situation the in-bound and out-bound connections between the City Services and the local systems can be:

- Cloud-based or centralized (though not necessarily available physically in a single node) if the interface with the local system is designed, developed and running according to the MoveUs specification.
- Specific (direct connection) to the local system, whenever the common interface is not foreseen for the very specific use or connection with the local system.

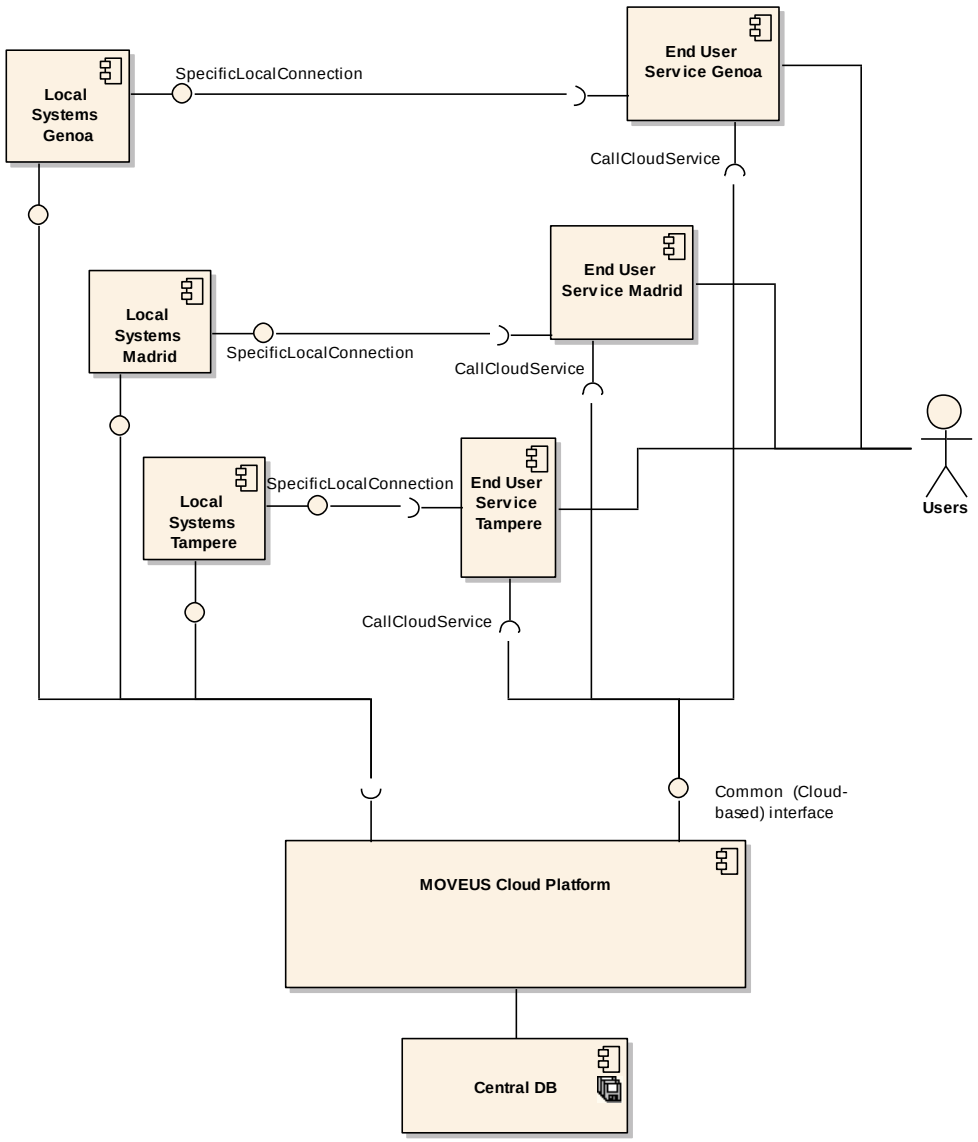

Figure 1 - Architectural overview

1.2 The MoveUs City Services

The City Services considered in MoveUs can be overall divided into the following groups:

- S1. Services for **personal mobility**: This category includes single and fully integrated applications which will be running on users' smartphones (for the general public). These rely on the technical operations, resources, APIs and services of the MoveUs platform. Part of the services will be specific to one city while others will be realized in common. Besides the customization in terms of functionalities and data, other customizations could be considered for language, skins and logos applied locally.
- S2. Services for **professional transport:** the existing services may have different behaviour or dedicated functions that will apply to the

professional transport. On the other hand, there will be tools and services specifically developed for the professional transport or special categories of users. The MoveUs data model specified in the Deliverable D3.1 [2] has been designed to allow a complete flexibility from this perspective.

- S3. Services for **traffic and mobility operators** (incl. public transport, bike hiring, etc.). These services are usually related to the management of features, functions or data generated by using the city services for the end users. An example is the console for the management of crowded sourced data (feedbacks) that is dedicated to the operators of the Traffic Control Centre.

The technical and functional definition of the city services is derived from the use case definitions that provide a description at a higher level.

The city services, analysed in each detail and feature are different, in principle, from city to city. The most evident differences are macro functions that are found in a city and not in another. Example of this is the carpooling-related function that can be found in Genoa and not in Tampere. As already introduced, the management of such differences has to be considered in the present technical specification because it can be part of the city services themselves. The question on final city services being implemented in the cities as separate groups of software components (one or more group per city) or with aggregations of such software components (common to more than one city) has been answered as follows:

- Final services that are very specific to the city will be implemented in that city only.
- Final services that have commonalities or features which makes them potentially available as a single product will be implemented as a common group of software components common to all sites

This approach applies to the city services where differences exist and can be managed depending on the preferences in the city. All city services (city-specific and common ones) are based on the APIs of the MoveUs platform and therefore have to be considered, in any case, automatically transferable to other cities because the same APIs can be available, with the same specification (the MoveUs platform specification) in every city that adopts the MoveUs platform.

A mechanism is required to manage the differences of the city services that will be implemented as common pieces of software for more than one site but have, in any case, different aspects in terms of features and sub-functionalities from site to site. The chosen mechanism is a registry that contains metadata specific for the cities (or in general geographical areas). The data model of the registry is specified in deliverable D3.1.

1.3 Scope of the document

This deliverable D3.3 deals with the specification and design of the MoveUs city services providing full detail from both technical and functional perspectives.

Together with all remaining deliverables of Work Package 3 it can be seen as part of the technical specification of the entire MoveUS system.

Specifically, with respect to the city services, the Deliverable D3.4 - Data Security & Privacy in the MOVUS system architecture [4] addresses horizontal and system-wide security analysis and design aspects. For this reason, as far as MoveUs services are concerned, both deliverables should be regarded as complementary, jointly conforming a single and unique specification that will drive the implementation phase with D3.4 covering the security aspects not specified in D3.3 but having a clear impact on service development.

Considering this, some decisions will be made on the implementation of certain security features and recommendations at the different city pilots as identified in the technical specification. These will be tackled during the 2nd project year, mostly focused on system and service implementation.

2 Organization of the technical specification

The driving factors of the technical specification for the cities services are:

- The general project indications from the DoW
- The definition of the use cases for each city achieved in task T2.5
- The incentive-based model developed in task T2.4
- The privacy and security recommendations and indications developed in task T3.4

Furthermore, the specification of the city services has to be developed according to the architecture design of task T3.2 and the specification of the MoveUs platform functions.

Considering the above driving factors, a **common structure and format** for the **description/specification** of the city services is defined. This format allows describing the functionalities and operations in details, especially by considering the **differences** from city to city and how to manage these.

2.1 Methodology

The main input for the classification of the city services is the use case definition. Here, the functional elements have already been defined and agreed among the project partners and will be reflected into the structure of the specification provided for the city services:

- For each *Reference Use Case* there is one or more main *Services* that can be a mobile app, a web tool or other software. An example of service is the Multimodal Journey Planning Service
- Each service is composed by a number of *functionalities* or functional elements.

The single *City services* are identified with the following minimum set of information:

City Service	Name of the city service
Cities that implement the service	List of Cities
Reference Use Cases	Use Case: Genoa … Use Case: Madrid … Use Case: Tampere …

Table 1 – Minimum set of information for the city services

A City Service can be further de-composed or described by sub-sets of functionalities or operations, from now on called *sub-functions*. The technical specification is provided in relation to each *sub-function*.

Besides the identification of the sub-functions another key element has to be considered for the production of the technical specification of the City services: the presence of City Services defined and implemented in common to more Cities yet having differences in terms of behaviour, operations, features etc. The basic needs are then to:

a. Describe which part of (and how) the sub-functions of the City Services can be different from City to City.
b. Specify the operations, algorithms or mechanisms that have to be introduced to handle the differences and make them coexisting within a unique City service.

2.1.1 High-level analysis

For the MoveUs City Services that are designed and developed as a unique piece of software (in common to more Cities) a high level analysis of the expected behaviour is achieved with the following criteria except for very simple ones:

- by each City
- for each sub-function

Formally, this analysis is supported by the following steps:

Step	Responsible
Identification of the sub-function	Made in common
Classification of the sub-function according to the MoveUs high-level functions defined in the Use Case definition (D2.2) and also considered in the Architectural definition (Deliverable D3.2.1 – Functional Viewpoint).	Made in common
Description of the expected behaviour for the sub-function by each city.	Single City

Table 2 – Preliminary analysis for services common to more cities

2.1.2 Detailed specification

The output of the high level analysis gives a simplified view of the situation that can support the subsequent production of a more detailed specification. Here, more formal tools are used to:

- Define exactly the single technical elements and operations necessary for the sub-function

- Specify which parts of these technical elements and operations can be considered common to more cities
- Specify which are the additional elements and operations that have to be introduced in order to make harmonize all requirements emerging from the cities.

The following section provides the structure and format of the detailed specification.

2.2 Specification Format

2.2.1 High-level analysis

The high level analysis introduced in section 2.1.1 is achieved with a table for each sub-function where the expected behavior (description of the sub-function) is specified for each city.

Name of the sub-function	*High Level View*	*Last revision date*
City	**Description**	
Name of the city	Expected behavior for the sub-function	

Table 3 – Specification format for high-level analysis

2.2.2 Elements

A first table is introduced for the detailed technical specification, called: Elements. It describes the technical elements (controls, objects etc.) that are physically present for the sub-function.

The description is made with a table having the following information organized in columns:

- **ID**: an identifier for the element. This is composed by:
  - The letter "E" (Element)
  - An acronym of the functionality, for example UR for User Registration
  - An acronym of the element
- **Name**: the name of the element of the user interface.
- **Type**: the type of the element of the user interface: a form, a button, a text area etc.
- **Description**: The description of the role and scope of the element
- **City**: An "X" indicates if the *Element* is applicable to a city. Three separate columns are present:
  - **G:** Genoa
  - **M:** Madrid
  - **T:** Tampere

NOTE: the same format is adopted to describe City-specific services. In this case the last column is omitted.

Name of the sub-function		*ELEMENTS*		*Last revision date*		
ID	**Name**	**Type**	**Description**	**G**	**M**	**T**

Table 4 – Specification format for the Elements of the function

2.2.3 Operations

A second table is introduced for the detailed technical specification, called: Operations. This section describes the operations foreseen for / executed within the functionality. When applicable, the description shall be done in relation to the Elements previously identified.

The operations are described in a table with the following elements:

- **ID**: an identifier for the operation. This is composed by:
  - The letter "O" (Operation)
  - An acronym of the functionality, for example UR for User Registration
  - An acronym of the operation
- **Operation**: Name of the operation
- **Description**: The description of the operation. When applicable, this description shall be complemented by the *Flow chart diagrams* of the most significant interactions, calculations, operations occurring. Such flow chart shall contain the references to the relevant MoveUs Platform services when necessary.
- **Ref. Element**: the ID of the element the operation refers to.
- **City**: An "X" indicates if the Operation is applicable to a City. Three separate columns are present:
  - **G:** Genoa
  - **M:** Madrid
  - **T:** Tampere

Name of the sub-function		*OPERATIONS*		*Last revision date*		
ID	**Operation**	**Description**	**Ref. Element**	**G**	**M**	**T**

Table 5 – Specification format for the Operations of the function

NOTE: the elements and operations allow the detailed functionalities to be specified. During the implementation phase equivalent elements or operations could be introduced to achieve the same behavior or function.

2.2.4 Link with the MoveUs Platform specification

Each sub-function can use (or be supported by) one or more functions of the MoveUs platform which, in turn, belongs to a certain MoveUs high level function group.

As a simplified example, in order to visualize the information of the urban traffic data within a certain city service, at least the following MoveUs functions are used:

FunctionID	Name	MoveUs high-level function	Group
3.1.1.9	Output Urban Traffic Data	GET	Urban Traffic
3.1.1.10	Collect Urban Traffic Data	SEN	Urban Traffic

Table 6 – Example of available high-level functions of the MoveUs platform

In order to have a simplified and more direct mapping between the sub-functionalities of the city service and the functions of the MoveUs platform, two sets of information are provided:

a. The association between a sub-function and the MoveUs high-level function, as specified in section 2.1.1.
b. A detailed specification of the MoveUs platform functions used for the sub-functions of the city service.

The description as in point b. is achieved by a specific, additional table called *Interaction with the MoveUs Platform Services* which specifically refers to the technical specification of the MoveUs platform found in:

- Deliverable D3.1 (MoveUs Data Model)
- Deliverable D3.2.1 (MoveUs Platform Specification and Architecture)

The reference to the MoveUs platform services allows linking the functionality to the applicable datasets, services and APIs as specified in the previous documents.

2.2.5 Anonymous access

Anonymous access is the condition where the services are used with no previous registration and usage of a custom profile (login).

Anonymous access-related specifications and indications are given for the MoveUs city services. In some cases a detailed feature-by-feature indication is provided with an additional column (marked by "A" - Access) having the following values:

X	Anonymous access is applicable
-	Anonymous access is not applicable
P	Anonymous access is partially applicable or has to be managed with an appropriate management of some specific features.

Table 7 – Specification format for anonymous access

Additional notes may be present for anonymous access non applicable or partially applicable.

At the beginning of each service definition the approach and solution identified for using the services with anonymous access is explained in a dedicated paragraph.

3 List of MoveUs City Services

Before providing a formal specification of the single functionalities, a summary of the city services that will be provided in MoveUs is given.

3.1 Common or centralized city services

The following services are defined as common or centralized and are applicable to and used by users in cities.

City Service	MoveUs Mobility App
Cities that implement the service	All
Reference Use Cases	**Genoa**: **UC1** Personal multi-modal journey planner with energy calculator, incentives & rewards management and electronic wallet functionalities **Madrid**: **UC2a** Smart Routing for pedestrian **UC3**: Eco-efficient route planning and traffic prediction **Tampere:** **UC1** Calculation of Multimodal Journey Options that includes bus, bike and car modes as well as bike stands, parking places and EV charging locations. **UC2** Estimation of consumption per Journey Options. The user can see the equivalent of energy. **UC3** User tailored incentive-based visualization of Journey Options. **UC4** Parking Place location and availability. It provides to car drivers the possibility to find parking places nearby and know the number of available free car slots.
City Service	Incentives-related Web-based Tools
Cities that implement the service	The tools provide all functionalities for incentive management and will be common to all cities where Incentives-related functionalities are available
Reference Use Cases	Incentives, Coupons, Advertisement, Vouchers provision

Table 8 – Common or centralized city services

3.2 Genoa-specific city services

City Service	Operator console for feedback information management
Cities that implement the service	Genoa
Reference Use Cases	UC2 Integration of crowd sourced data into the Genoa traffic supervisor

Table 9 – Genoa-specific city services

3.3 Madrid-specific city services

City Service	Priority for Public Transport vehicles
Cities that implement the service	Madrid
Reference Use Cases	UC1 - Smart Prioritization for Vehicles This service is expected to give priority to specific vehicles (public buses) on intersections 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.
City Service	Smart crossing for pedestrian
Cities that implement the service	Madrid
Reference Use Cases	UC2b - Smart Crossing for pedestrian It provides smart crossing options for pedestrian, whether using special crossing points – SafeCross – or by applying a reaffirmation of a demand.

Table 10 – Madrid-specific city services

3.4 Tampere-specific city services

City Service	Energy consumption status and suggestions
Cities that implement the service	Tampere
Reference Use Cases	**UC2** Estimation of consumption per Journey Options. The user can see the equivalent of energy. This service will be used by MoveUs user to access their energy consumption status, including the current performance and compare with previous

	times. It will show the available incentives considering their performance and a set of suggestions to improve in case they would like to be friendlier with the environment with their mobility decisions.

Table 11 – Tampere-specific city services

4 Common MoveUs City Services

This section describes the MoveUs city services that are developed in common to more cities

4.1 Mobile App for Journey Planning and mobility information

Many of the features and functionalities specified in the use case definition from all cities can be grouped together into one main *Multimodal Trip Planning* service enriched with the provision of mobility-related information, application of incentives and provision of crowd-sourced feedback data.

This city service is intended to cover the following use cases, fully described in the deliverable D2.2:

[GENOA] UC1 Personal multi-modal journey planner with energy calculator, incentives & rewards management and electronic wallet functionalities.

[MADRID] UC2a Smart Routing for pedestrian.

[MADRID] UC3 Eco-efficient route planning and traffic prediction

[TAMPERE] UC1 Calculation of Multimodal Journey Options

[TAMPERE] UC2 Estimation of Consumption per Journey Option

[TAMPERE] UC3 User tailored incentive-based visualization of Journey Options

[TAMPERE] UC4 Parking Place location and availability

The requirements and expectations of the above use cases converge into the main objective of providing support to the citizens and their mobility needs either *on the road* and in a *pre-trip* phase with an effective, usable and reliable *information service*.

Although the neutrality of the technological approach remains valid, it seems appropriate and reasonable to identify from the beginning this service as a *mobile tool.* This assumption lets better define and optimize the technical specification especially in relation to the user interface aspects that would otherwise be too generic and therefore poorly effective for the implementation phase.

The *tool* will be more precisely a *mobile application* for which, anyway no specific constraint is neither imposed nor suggested in terms of operating system nor supporting platform. A mobile application can be a multi-platform web tool, available on a browser or software developed for a mobile operating system like Android or iOS.

The main working principles of the user interface can be simply summarized with the presence of a number of *sub-functions* that can be combined (or in some cases

invoked within each other) and a *main menu* always accessible and necessary for activating the *sub-functions*.

The following sub-functions are identified for this service:

- Main screen menu
- User Registration
- Login
- Trip Planning (further de-composed in more sub-functions)
- Access to personal information
- Get information
- Feedback functions

The following sections define, for each sub-function identified in the previous list, the technical specification using the structure defined in section 0.

4.1.1 Main screen menu

4.1.1.1 Description

The main screen menu is a list of commands, buttons or icons through which the single main functions can be launched.

The functions will be available based on:

- The User profile
- The location (City).

The **selection of the active City** is operated according to the following criteria:

a) The system tries to automatically detect the location and to associate it with an existing City
b) A registered user can indicate a default City from the user registration. If this preference exist the default City will be used and will override the automatic location detection.
c) A manual selection of the City will be possible from the service's toolbar.

4.1.1.2 High-level analysis per City

HIGH LEVEL ANALYSIS	*City service:* ***Trip Planning***	*Last revision: 13/06/2014*
MoveUs High level Function: **-**		*Sub-function:* ***Main menu management***

City	**Description**
Genoa	All functions will be available in the main menu as buttons/shortcuts. • Access to mobility information • Trip Planning

	• Access/Edit personal data • Car Pooling options • General Options (for example selection of another city) • Shortcuts to incentives-related web tools (sect 4.2) • Etc.
Madrid	All functions will be available in the main menu as buttons/shortcuts. • Access to mobility information • Trip Planning • Access/Edit personal data • General Options (for example selection of another city) • Downloading apps for the specific city services • Etc.
Tampere	All functions will be available in the main menu as buttons/shortcuts • Trip planning • Access/Edit personal data • Access to energy consumption status • Parking place location • General options (for example selection of another city)
Notes for the management of the differences	The main menu should be dynamically populated with the sub-functions foreseen for the selected city. If needed also some layout customization will be dynamically activated.

Table 12 – Main menu management – High level analysis

4.1.1.3 Anonymous access

The possibility of implementing an anonymous access for this group of functionalities is expressed in details in the additional column ("A").

4.1.1.4 Elements

Main Menu Management		*ELEMENTS*		*Last revision: 21/10/2014*			
ID	**Name**	**Type**	**Description**	**G**	**M**	**T**	**A**
E-MM-M	Main menu	List or grid of button or commands	List of commands that launch the main functionalities including direct access to specific apps and tools (like	X	X	X	X

			smart crossing app, incentives tools, energy consumption status and suggestions app, etc.)				
E-MM-M-ext	Main Menu extended	List of links/icons for downloading specific apps	List of links for downloading apps for specific city services (depending on the city where the user is located)	X	X	X	X

Table 13 – Main menu management – Elements

4.1.1.5 Operations

The operations in relation to the *Elements* previously defined are described as follows.

Main Menu Management	*OPERATIONS*		*Last revision: 21/10/2014*				
ID	**Operation**	**Description**	**Ref. Element**	**G**	**M**	**T**	**A**
O-MM-VIS	Visualization of the main menu	The menu items are displayed according to the entries of the internal registry. The application retrieves the information on the active City by • Automatically detecting the location and by associating it with one of the MoveUs Cities. • Using the preference on the default city if available	E-MM-M	X	X	X	P
O-MM-VIS-ext	Visualization of the extension of the main menu	The links for downloading specific apps are displayed according to the city where the user is located	E-MM-M-ext	X	X	X	X

O-MM-SEL	Selection from the main menu	The selection of an item of the main menu executes the related functionality.	E-MM-M	X	X	X	X
O-MM-SEL-ext	Selection from the extension of the main menu	The selection of a link of the extension of the main menu executes the related downloading.	E-MM-M-ext	X	X	X	X

Table 14 – Main menu management – Operations

4.1.1.6 Interaction with the MoveUs Platform Services

The following table indicates the service and package of the MoveUs platform used in the previously described operations:

Main Menu Management	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 29/09/2014*
Operation ID	**MoveUs Service**	**Data Model Package**
O-MM-VIS	GetApplicationConfiguration (UserId, location) // GetApplicationConfiguration (USerId, X, Y)	Registry
O-MM-VIS-ext	GetAvailableServices (version:string)// GetAvailableServices (User_id: string, Location: string)	Registry

Table 15 – Main menu management – *Interaction with MoveUs platform*

4.1.2 User registration

4.1.2.1 Description

The registration procedure allows the user to create a custom profile that allows to store:

- A user identifier and a password for reserved access
- A basic user profile (not necessarily including personal information)
- A mobility-related profile with information about mobility habits and preferences.

The registration can be separated in two different phases

1. In the first one the user provides a minimum set of data to access the system

2. In the second one the user can insert the detailed information about his profile

The registration data are sent to the MoveUs platform that processes the request. If the data is valid the service creates a user profile. Otherwise the MoveUs platform returns an error that has to be processed and reported back to the end user, in the registration page itself.

4.1.2.2 High level Analysis

Due to the low level of complexity of this sub-function no city-specific high-level analysis has been done for this sub-function.

4.1.2.3 Anonymous access

The specification of anonymous access is not given for these functions because of the obvious association and meaning of the function with anonymous access features.

4.1.2.4 Elements

User Registration		*ELEMENTS*		*Last revision: 29/09/2014*		
ID	**Name**	**Type**	**Description**	**G**	**M**	**T**
E-UR-BR	Basic Registration Form	Form	Form element that allows the users to insert the preliminary data for the registration.	X	X	X
E-UR-DA	Disclaimer area	Text area	Contains the disclaimer with notes about privacy information and the terms of use. The user must explicitly accept these conditions to proceed with the registration. A command for profile cancellation is also present to notify the administrators about this.	X	X	X
E-UR-NA	Notification area	Text area	A portion of the screen where notifications about the request can be provided	X	X	X
E-UR-PP	Personal Data	Form	Form element that allows users to insert personal information like name, telephone number etc. This operation is optional for using almost all service functionalities, even as a	X	X	X

			registered user. Nevertheless it may be required for certain incentives-related operations like the emission of a personalized voucher.			
E-UR-VE	Vehicle form	Form	Form element that allows users to insert information on vehicles used: engine type, power, fuel consumption and other environmental-related data.	X	X	X
E-UR-UT	Usual Trips Form	Form	Form element that allows users to insert information on usual trips: origin, destination, time & calendar	X		X
E-UR-MP	Mobility Preferences Form	Form	Form element that allows users to insert the preferred mode of transport. The modes are different from a city to another and will be dynamically retrieved.	X	X	X
E-UR-CITY	Default City Form	Form	Form element that allows users to insert the information on the default (preferred) City	X	X	X
E-UR-PP	Personal Preferences Form	Form	Form that allows users to insert other personal preferences like Enable/disable push notifications, Enable/disable real time tracking, etc.	X	X	X
E-UR-CP	Car Pooling Form	Form	Form that allows users to insert information useful for car pooling like: preferred role (driver or passenger), gender, smoker etc.	X		X

Table 16 – User registration – Elements

4.1.2.5 Operations

The operations in relation to the *Elements* previously defined are described as follows.

User Registration		*OPERATIONS*		*Last revision: 29/09/2014*		
ID	**Operation**	**Description**	**Ref. Element**	**G**	**M**	**T**

O-UR-PR	Preliminary registration	The *Basic Registration Form* opens. The user indicates: • username, • password A CAPTCHA mechanism should be also included for security reasons. Following the principles of Two-factor authentication, the MAC address of the user's device is retrieved and a code, calculated on the basis of the MAC address (not the address itself) stored as part of the user profile.	E-UR-BR	X	X	X
O-UR-PS	Acceptance of terms of use and submission of preliminary data.	In the *Basic Registration Form* a "Submission" button is present and is enabled once the user selects a checkbox for the acceptance and visualization of the terms of use and privacy information (element *Disclaimer area*). Once the "Submission button" is selected the app performs a basic internal check on the correctness of data and about the password satisfying the security requirements (minimum 8 characters with at least 2 numbers). If necessary an error message is shown in the *Notification area*. After this check the execution flow goes to the next operation (O-UR-PV)	E-UR-BR E-UR-BA E-UR-NA	X	X	X
O-UR-PV	Verification of preliminary registration data.	The *MoveUs platform* is invoked to check if the personal data already exist. If necessary a message is shown in the *Notification area* and the registration process restarts from the preliminary registration O-UR-PR. If no error occurs, the data is stored in the MoveUs Platform and the execution flow goes to operation O-UR-RV.	E-UR-NA	X	X	X

O-UR-PP	Registration of optional personal data	This operation is optional. The user can optionally indicate an email address. This will be used as a method for password recovery. A mechanism of email validation should be included by sending an email with an activation link. The user can also insert other personal information like name, telephone number, weight (for energy calculation) etc. for possible future use or additional functions. If no error occurs, the data is stored in the MoveUs Platform and the execution flow goes to the next operation.	E-UR-PP	X	X	X
O-UR-RV	Registration of vehicle data	The user can insert the data on used vehicles: engine type, power, fuel/energy consumption, year of the vehicle. If no information is indicated, the operations/functions that should make use of it will not be enabled or will use default information in the case of the energy module. The registration of vehicle data is mandatory for the provision of the services included in UC3 in Madrid. Except for the above case, the operation is optional. If no error occurs, the data is stored in the MoveUs Platform and the execution flow goes to operation O-UR-RU.	E-UR-VE	X	X	X
O-UR-RU	Registration of usual trips	The user can insert the data on usual trips: origin, destination, time & calendar. This operation is optional. If no information is indicated, the operations/functions that should make use of it will not be enabled. If no error occurs, the data is stored in the MoveUs Platform and the execution flow goes to operation O-UR-RM.	E-UR-UT	X		X

O-UR-RM	Registration of mobility preferences	The user can insert the data on modal preferences: car, PT, bike, walk, car pooling, etc. This operation is optional. If no information is indicated, the operations/functions that should make use of it will not be enabled. If no error occurs, the data is stored in the MoveUs Platform and the execution flow goes to operation O-UR-RP.	E-UR-MP	X	X	X
O-UR-CITY	Registration of default City	The user can optionally indicate a default City from the available ones (retrieved from the Registry). This preference will be used every time the user accesses the service.	E-UR-CITY	X	X	X
O-UR-RP	Registration of personal preferences	The user can insert the data on other personal information as follows. If no error occurs, the data is stored in the MoveUs Platform and the execution flow goes to operation O-UR-RC.	E-UR-PP			
		Enable/disable push notifications		X	X	X
		Enable/disable real time tracking		X	X	X
		Enable/disable advertisement visualization		X	X	X
		Choose the role of the user: vehicle driver or passenger.		X	X	X
		Enable/disable Bluetooth identification.			X	
O-UR-RC	Registration of Car Pooling preferences	The user can insert the data on Car Pooling-related information (the car pooling profile): • CarpoolerName; • Smoker; • Animals; • HasBaggages; • ArrivalThreshold; • DeparureThreshold; • OriginRadius;	E-UR-CP	X		X

		• DestinationRadius; • SideArea; • AllowSmoker; • SameGender; • AllowBaggages; • AllowAnimals; This operation is optional. If no information is indicated, the operations/functions that should make use of it (car pooling trips search) will not be enabled. If no error occurs, the data is stored in the MoveUs Platform and the execution flow goes to the next operation.				
O-UR-IN	Information of implications on service provision if the registration forms are not filled in	If no information is indicated in the registration forms, a message will inform the user about which services or functionalities he will not be able to benefit of as a consequence.	E-UR-VE; E-UR-UT; E-UR-MP; E-UR-PP; E-UR-CP	X	X	X
O-UR-CC	Confirmation	At the end of the registration the user has the option to download and print off a card with the resume of the registration data to be stored in a safe place. After this phase the user is redirected to the operation for the management of the main menu (See 4.1.1.5).	None	X	X	X

Table 17 – User registration –Operations

Edit operations

The following table describes the operations occurring when an user edits the registration information.

User Registration		*OPERATIONS*		*Last revision: 29/09/2014*		
ID	**Operation**	**Description**	**Ref. Element**	**G**	**M**	**T**
O-ED-PR	Edit of preliminary registration data (including change	The *Basic Registration Form* opens. The user can edit the preliminary registration data. In order to change the password, if	E-UR-BR	X	X	X

	password)	required, the user indicates the old and new password (to be repeated twice for confirmation).				
O-ED-PP	Editing of personal data	The user can edit the personal data.	E-UR-PP	X	X	X
O-ED-RV	Editing of vehicle data	The user can edit the data on used vehicles: engine type, power, fuel/energy consumption.	E-UR-VE	X	X	X
O-ED-RU	Editing of usual trips	The user can edit the data on usual trips: origin, destination, time & calendar.	E-UR-UT	X		X
O-ED-RM	Editing of mobility preferences	The user can edit the data on modal preferences: car, PT, bike, walk.	E-UR-MP	X	X	X
O-UR-CITY	Editing of default City	The user can edit the default City from the available ones (retrieved from the Registry).	E-UR-CITY	X	X	X
O-ED-RP	Editing of personal preferences	The user can edit the data on other personal preferences: Enable/disable push notifications, driver/passenger role etc. (see the detailed applicability for the cities as in the *insert* operation)	E-UR-PP	X	X	X
O-ED-RC	Editing of Car Pooling preferences	The user can edit the data on car pooling-related information.	E-UR-CP	X		X
O-ED-CC	Confirmation	At the end of the editing operations the user is redirected to the operation for the management of the main menu (See 4.1.1.5).	None	X	X	X

Table 18 – User registration – edit operations

4.1.2.6 Interaction with the MoveUs Platform Services

The following table indicates the service and package of the MoveUs platform used in the previously described operations:

User Registration	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 29/09/2014*
Operation ID	**MoveUs Service**	**Data Model Package**
O-UR-PS	UserRegistration (AuthN UserId, DeviceId, PWD): Session token	IAM credentials
O-UR-PV	Result from UserRegistration call (O-UR-PS)	IAM credentials

O-UR-PP	SendPersonalData (UserId, PersonalData): returnRegistrationStatus	User Management (Personal Account. MV_PersonalProfile)
O-UR-RV	SendPersonalData (UserId, Vehicle Data): returnRegistrationStatus	User Management (Personal Account. MV_VehicleProfile)
O-UR-RU+ O-UR-RM+ O-UR-RC	SendDataOnMobility (UserId, MobilityData): returnRegistrationStatus	User Management (Mobility Preferences (MV_TransportRatings) + Car Pooling Preferences (MV_CarPoolingProfile) + UsualTrips (MV_UsualTrips)
O-UR-RU	SendDataOnMobility (UserId, UsualTrips) : returnRegistrationStatus	User Management User Account.UsualTrips (MV_UsualTrips)
O-UR-CITY	GetAvailableCities () SetPersonalDefaultCity()	Registry, User Management .Personal (*MV_PersonalProfile*. *MV_SpatialExtent*)
O-UR-RM	SendDataOnMobility (UserId, MobilityPreferences)	User Management .Mobility Preferences (MV_TravelerProfile.PreferedTransport)
O-UR-RP	SendPersonalPreferences (UserId, Personal Preferences)	User Management. Personal(MV_GeneralUserPreferences)
O-UR-RC	SendDataOnMobility (UserId, Car Pooling Preferences): returnRegistrationStatus	User Management (Car Pooling Preferences (MV_CarPoolingProfile)
O-UR-CC	GetAvailableServices (UserId, location): MV_Service*	Registry
O-ED-PR	ChangeUserPassword (UserId, OldPass, NewPass)	IAM credentials
O-ED-PP	SendPersonalData (UserId, PersonalData): returnRegistrationStatus	User Management (Personal Account. MV_PersonalProfile)
O-ED-RV	SendPersonalData (UserId, Vehicle Data): returnRegistrationStatus	User Management (Personal Account. MV_VehicleProfile)
O-ED-RU	SendDataOnMobility (UserId, UsualTrips)	User Management User Account.UsualTrips (MV_UsualTrips)

O-ED-RM	SendDataOnMobility (UserId, MobilityPreferences)	User Management (Mobility Preferences (MV_TransportRatings) + Car Pooling Preferences (MV_CarPoolingProfile) + UsualTrips (MV_UsualTrips)
O-ED-RP	SendPersonalPreferences (UserId, Personal Preferences)	User Management. Personal(MV_GeneralUserPreferences)
O-ED-RC	SendDataOnMobility (UserId, Car Pooling Preferences): returnRegistrationStatus	User Management (Car Pooling Preferences (MV_CarPoolingProfile)
O-ED-CC	GetAvailableServices (UserId, location): MV_Service*	GetAvailableServices (UserId, location): [MV_Service]*

Table 19 – User registration – *interaction with MoveUs platform*

4.1.3 Access / Login

4.1.3.1 Description

The login function is available for the registered users. It allows users to access the service with a custom profile and to activate the functions that make use of it. In general, the functions that use a custom profile require the information composing this profile to be indicated during the registration phase. (see 4.1.2).

4.1.3.2 Anonymous access

Login is only available for registered users.

4.1.3.3 High level Analysis

No city-specific high-level analysis has been done for this sub-function.

4.1.3.4 Elements

Login		*ELEMENTS*		*Last revision: 29/09/2014*		
ID	**Name**	**Type**	**Description**	**G**	**M**	**T**
E-LOG-LF	Login Form	Text fields and buttons	The form includes the username and password input fields, the submit button and the commands for activating the form for recovering a lost	X	X	X

			username or password.			
E-LOG-RE	Account recovery form	Link	Form for recovering a lost username or password. It allows inserting the email address if this has been indicated in the registration phase.	X	X	X

Table 20 – Login – *Elements*

4.1.3.5 Operations

Login	*OPERATIONS*	*Last revision: 05/09/2014*				
ID	**Operation**	**Description**	**Ref. Element**	**G**	**M**	**T**
O-LOG-AA	Access	The user indicates the username, password and select the submit button. The account is verified by the MoveUs platform. If the verification is successful, the user is redirected to the operation for the management of main screen menu (O-MM-VIS – see 4.1.1.5).	E-LOG-LF	X	X	X
O-LOG-AR	Access to account recovery	The user selects the command/link that opens the form for recovering a lost username or password.	E-LOG-LF	X	X	X
O-LOG-RE	User name and Password recovery	The user indicates the email address indicated in the registration phase and submits the request of username and password recovery. An email is sent by the MoveUs platform to the email address indicated with the necessary information.	E-LOG-RE	X	X	X

Table 21 – Login – *Operations*

NOTE ON PASSWORD RECOVERY: The mechanism of password recovery through the delivery of an email indicated in the registration phase is one of the possibilities, foreseen for a particular implementation. Other techniques are applicable in other MoveUs implementations where, for example the registration of the email address is not foreseen. Additionally, as described, during the registration phase the user can download and print his credentials.

4.1.3.6 Interaction with the MoveUs Platform Services

Login	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 29/09/2014*

Operation ID	**MoveUs Service**	**Data Model Package**
O-LOG-AA	Login (UserId, password)	IAM Credentials
O-LOG-RE	PasswordRecovery (email) // eMail to platform with an specific subject (e.g. password recovery)	IAM Credentials

Table 22 – Login – *interaction with MoveUs platform*

4.1.4 Trip Planning

4.1.4.1 Description

This section describes the technical specification of the sub-functions to be provided for each macro phase of the Trip Planning service:

- **Trip information and request**: in this phase the user should indicate the data composing a trip request
  - Start point
  - End point
  - Modes of transport
  - Etc.
- **Trip computation:** in this phase the service:
  - Shows the found trip solutions
  - Allows selecting a specific solution
  - Shows the details for the selected trip.
- **Trip Execution**: during this phase the service:
  - Shows traffic data
- **Post Trip:** in this phase the following operations can be performed:
  - Update of historical data
  - Update of incentives
  - Provision of feedbacks about the executed trip

The service makes use of a number of *functions* of the MoveUs platform as defined in the architecture description (deliverable D3.2.1). In a simplified view, the MoveUs high level functions most directly involved in the single sub-functions can be identified in the following table:

Macro Phase	Sub-function	MoveUs High level Function
Trip information and request	Trip Suggestion	PREI
	Input of start/end points	PREI
	Visualization of alternative transportation location	GET

	Visualization of car pooling options	POL
	Route suggestion based on traffic	GET
Trip Computation	Trip computation, selection and visualization	PRET
Trip Execution	Visualization of traffic information	ONT
Post Trip	Update of historical data, incentives and feedback provision	POS, INCM

Table 23 – Trip Planning – High level functions

4.1.4.2 High-level analysis per City

HIGH LEVEL ANALYSIS	*City service:* ***Trip Planning***	*Last revision: 05/09/2014*
MoveUs High level Function: ***PREI***	*Sub-function:* ***Trip Suggestion***	
City	**Description**	
Genoa	The mobile app receives from the *MoveUs Platform : Identity Provider* suggestions for a new trip (e.g. most frequent trips) and automatically fills-in the start/end elements of the trip input form	
Madrid	Not applicable for Madrid	
Tampere	The mobile app will provide to the MoveUs user once it has been validated a list of usual trips (start/end locations) based on the time and day of the week when the user is accessing. When the user selects one of the options, the app will fill automatically the data for a new journey plan request	
Notes	Trip suggestion only activated for Genoa and Tampere maybe with a few differences	

Table 24 – Trip planning – Trip suggestion – High level analysis per city

HIGH LEVEL ANALYSIS	*City service:* ***Trip Planning***	*Last revision: 05/09/2014*
MoveUs High level Function: ***PREI***	*Sub-function:* ***Input of start/end points***	
City	**Description**	
Genoa	Within the trip input form, the user specifies all data composing the trip request. The trip options include: • Start • Destination • Mode of transport	

	• Calendar (date and time) The *MoveUs platform : Geocoder* resolves the start/end point if it is an address or a POI
Madrid	Within the trip input form, the user specifies all data composing the trip request. The trip options include: • Current position as start point • Destination • Mode of transport • Current date and time of departure will be considered If car mode of transport is selected, the application will ask the user to select the role of driver or passenger; if no selection is made, the role indicated in the registration phase will be considered by default.
Tampere	The mobile app will provide the following options to the user for planning a trip: • Start • Destination • Mode of transport (all, car, bike, bus) • Date and time of arrival/departure Note: Date and time could be also included in this option as ITS Factory gives the possibility to specify this information in their messages
Notes	The sub-function can be unified

Table 25 – Trip planning – Input of start/end point -High level analysis per city

HIGH LEVEL ANALYSIS	*City service:* ***Trip Planning***	*Last revision: 05/09/2014*
MoveUs High level Function: ***GET***		*Sub-function:* ***Visualization of Alternative transportation location***
City	**Description**	
Genoa	The user location can be retrieved through the GPS or GSM-based positioning systems. The position of the bus stops, parking places can be provided. The purpose of the Get information service would be to use the Location	

	Based Services and select the point as a start/end point for a journey.
Madrid	Once the user has been located in PREI (see previous table), the mobile application can obtain from MoveUs platform relevant information of alternative transport modes , like the location of nearby bike stations and bus stops, public bus lines and schedules, availability of bikes or location of smart crossings, traffic information and incidents, etc.
Tampere	When the user doesn't know the specific address of the current position (starting point) the mobile app will provide the possibility to use the GPS of the mobile device to introduce the current location as starting position. A list/map with the closest bike stands and bus stops will be provided to the user.
Notes	The following features can be implemented in common: • User position retrieval • Visualization of nearby locations (objects) that become available as start or destination points The type of objects can be different from one city to another

Table 26 – Trip planning – Visualization of alternative transportation location - High level analysis per city

HIGH LEVEL ANALYSIS	*City service:* ***Trip Planning***	*Last revision: 05/09/2014*
MoveUs High level Function: ***POL***	*Sub-function:* ***Visualization of Car Pooling options***	
City	**Description**	
Genoa	Once the user indicates the start/end points, car pooling options of interest for the requested trip are searched into the car pooling database. The available options are displayed.	
Madrid	Not foreseen for Madrid	
Tampere	Similar as for Genoa.	
Notes	*Car pooling* options activated in Genoa and Tampere.	

Table 27 – Trip planning – Visualization of car pooling options - High level analysis per city

HIGH LEVEL ANALYSIS	*City service:* ***Trip Planning***	*Last revision: 05/09/2014*
MoveUs High level Function: ***GET***		*Sub-function:* ***Route suggestion based on traffic***

City	Description
Genoa	Not foreseen for Genoa
Madrid	When in PREI the user selects the car as mobility option, then the smartphone application connects to MoveUs platform and requests to obtain routing options by car, including the route criteria selected by the user (the fastest, the greenest, etc.), The route by car obtained from MoveUs platform will be shown as another mobility alternative offered in ONT functionality.
Tampere	Not foreseen for Tampere (some information related with emergency will be considered but this will not be displayed to the user, it will only be considered for the calculations of energy cost)
Notes	Only activated for Madrid

Table 28 – Trip planning –Route suggestion based on traffic - High level analysis per city

HIGH LEVEL ANALYSIS	*City service:* ***Trip Planning***	*Last revision: 05/09/2014*
MoveUs High level Function: ***PRET***		*Sub-function:* ***Trip computation, selection and visualization***

City	Description
Genoa	A list of multimodal routes is retrieved by invoking the trip planner via the common trip planner interface. The result is a list of route solutions Once the list of route solutions is obtained the user can select a specific route and get the details for the route The response is obtained and returned back to the end user/mobile app. A visualization of the route is provided with a map and a list of instructions
Madrid	A list of different journey options will be provided to the user. The application prioritizes the eco-efficient or the smartest ones according to the user preferences already typed (or taken by default from the registration forms). Once the list of route solutions is obtained the user can select a specific

	route and get the details for the route: - Estimated time of the travel - Distance covered by the route - Information of the points of interest –stops, stations, bus lines, etc.- - Information of the smart crossings (only in the case of walking routes) - Advanced traffic information (only in the case of route by vehicle) - Credits associated to the route selected, depending on the capabilities of the credits engine (to be specified and developed later on) As response, the mobile app will provide to the user a visualization of the selected route and list of instructions. In addition, the application will track the user along the route so that, in case of a traffic event that significantly modify the time of travel estimated for the route selected by user, it will automatically notify the user the traffic warning and will offer the user the option of re-routing on-trip, by taking the current location as the new starting point and the destination already typed.
Tampere	Once the different journey options are provided to the user, it should be needed to show then in a list for selecting the desired modality of trip and the chosen route. Each journey option will include: • Trip modality • Route • Expected time of the trip • Estimated time of arrival, • Energy and CO2 consumption Once the user makes a selection of a journey option, the information is sent to the MoveUs platform. As response, the mobile app will provide to the user a visualization of the selected route and list of instructions.
Notes for the management of the differences	In all cities it is foreseen to have a two-steps interaction: Visualization of journey trip solutions Selection of a specific solution and visualization of details.

Table 29 – Trip planning – Trip computation, suggestion and visualization - High level analysis per city

HIGH LEVEL ANALYSIS	*City service:* ***Trip Planning***	*Last revision: 13/06/2014*
MoveUs High level Function: ***ONT***		*Sub-function:* ***Visualization of Traffic information***

City	Description
Genoa	Not foreseen
Madrid	A map with information of the levels of service (the level of traffic in different stretches of the road network) will be shown, using different colors for different levels of traffic. Also, icons representing traffic incidents and pop-ups with traffic information of interest will be shown in the map to the user.
Tampere	Not foreseen
Notes for the management of the differences	Only foreseen (so, to be activated) for Madrid

Table 30 – Trip planning – Visualization of traffic information - High level analysis per city

HIGH LEVEL ANALYSIS	*City service:* ***Trip Planning***	*Last revision: 13/06/2014*
MoveUs High level Function: ***POS, INCM***		*Sub-function:* ***Update of historical data, incentives and feedback provision***

City	Description
Genoa	The historical information on Mobility (including execution of trips, energy consumption) is updated with the current data by invoking the *MoveUs Platform: Identity Provider.* The status of the incentives retrieved during the Trip request formulation is also updated
Madrid	The smartphone application will inform MoveUs platform about which route has been selected by the user for the tracking, verification and statistical analysis, for the updating of credits gained by his mobility choice and for the possible provision of further incentives to the user. The historical information on Mobility (including execution of trips, energy consumption) is updated with the current data by invoking the *MoveUs Platform: Identity Provider.* The status of the green points retrieved during the Trip request formulation is also updated into the user profile.

	Finally, the provision of overall feedback of the user about the services provided with will be stored in his personal account for future statistical analysis by the service providers.
Tampere	The historical information on Mobility (including execution of trips, energy consumption) is updated with the current data by invoking the *MoveUs Platform: Identity Provider.* The status of credits is also updated for future incentives. The mobile application will provide the possibility to the user for giving feedback and evaluate the chosen trip. This information will be stored so it can be used for future journey plans.
Notes	

Table 31 – Trip planning – High level analysis per city

4.1.4.3 Resume of Sub-functionalities per City

As an intermediate step between the high-level analysis and the detailed one, the previously identified sub-functions are further de-composed and an assignment in terms of presence/absence of the sub-function is done with the following table:

Macro Phase	Sub-function	M	G	T
Trip information and request	Trip Suggestion		X	X
	Input of start/end points	X	X	X
	Visualization of alternative transportation location	X	X	X
	Visualization of car pooling options		X	X
	Route suggestion based on traffic	X		
Trip Computation	Trip computation, selection and visualization	X	X	X
Trip Execution	Visualization of traffic information	X		
Post Trip	Update of historical data	X	X	X
	Update of Incentives	X	X	X
	Feedback provision	X	X	X

Table 32 – Trip planning – Resume of sub-functionalities per city

4.1.4.4 Integration of Car Pooling Services

MoveUs works in cooperation with external or "federated" car pooling systems and allows internal data storage for both car-pooling preferences and trip offerings. The following points defines how the integration of the external car pooling systems is achieved:

1. Car pooling-related personal preferences usable to search the available (external) car pooling trip offerings can be defined and stored in MoveUs.
2. Within the trip planner function, the car pooling trip offerings are retrieved according to the user trip request and based on the car-pooling preferences. The available car pooling trips are retrieved from the local (external) car pooling systems and rendered or temporarily stored according to the reference MoveUs car pooling trip data model. The data model includes all details of the trip and, for each trip, the reference (URL and metadata) to the external car pooling systems.
3. The operations of agreement (establishment of a first contact) between the user requesting the trip and the user offering it are not carried out in the context of MoveUs. Instead, a redirect to the external system (to which the trip offering is associated) is foreseen. The redirect is carried out with the parameters that uniquely identify the trip offerings.

4.1.4.5 Anonymous access

The possibility of implementing an anonymous access for this group of functionalities is expressed in details in the additional column ("A").

4.1.4.6 Elements

Trip Planning		*ELEMENTS*		*Last revision: 21/10/2014*			
ID	**Name**	**Type**	**Description**	**G**	**M**	**T**	**A**
E-TP-OD	Origin and destination fields (O/D fields)	Text elements	Input elements used to indicate in a textual form the origin and destination points	X	X	X	X
E-TP-MT	Modes of transport	Selectors (checkbox)	Checkboxes or switchable buttons that indicate the activation of one or more mode of transport to be considered for the trip request	X	X	X	X
E-TP-TC	Time and calendar	Time picker and calendar	Time Picker and Calendar that are used to indicate at which time and for which date the trip has to be requested	X		X	X
E-TP-RO	Route options	Selectors (checkbox)	Checkboxes or switchable buttons that indicate the activation of one or more search criteria like: shortest route, fastest route etc.	X	X	X	X
E-TP-MP	Map picker	Buttons	Buttons that open an interactive map through which the origin and destination points can be selected and geo-coded; origin can be	X	X		X

			automatically filled in with the use of the GPS of the smart device.				
E-TP-RS	Request submission	Button	Button for submitting the trip request	X	X	X	X
E-TP-CP	Car pooling solutions panel	Text/graphic area	Panel where the information on the found route solutions are displayed.	X		X	X[1]
E-TP-TP	Trip solutions panel	List of selectable elements	Panel where the information on the found route solutions is displayed. The environmental and Energy Consumption data is also clearly reported here for each solution.	X	X	X	X
E-TP-IM	Interactive map	Map	Interactive map component that is used to show graphically the information and to obtain further details.	X	X	X	X
E-TP-TI	Trip instructions	Text/ graphic area	List of instructions or indications that describe textually each single leg or segment of the trip that has been selected.	X	X	X	X
E-TP-TICAR	Car trip specific instruction	Text/graphic area	In addition of what is included in E-TP-TI (Trip instructions) for the case of routes by car this Element will include advanced traffic information of relevance.		X		X
E-TP-FBS	Feedback panel for single segments	Form with text and buttons	Panel for indicating the feedback information (Boolean selectors for “good” or “bad” quality information)	X		X	X
E-TP-TB	Trip toolbar	Toolbar	Toolbar dynamically populated with the command buttons necessary to manage the different operations related to the trip.	X	X	X	X
E-TP-TR	Traffic panel	Text/graphic area	Map with graphic representation of route by car from O to D. It includes		X		X

[1] For anonymous users the Carpooling service can have only part of the features (e.g no car pooling profile for a more precise matching)

			graphic information of LOS per leg and textual information of distance, and estimated travel time and advanced traffic information.				
E-TP-TIW	Traffic incident warning panel	Graphic area and buttons	The icons/texts of the incidents in the users' route will pop-up upon the traffic panel giving basic information about the traffic incident occurred. Also, two buttons will be shown to the user so as to confirm /refuse re-routing.		X		-[2]
E-TP-UTS	Selection of type of car trip user	Selectors (checkbox)	Checkboxes or switchable buttons that indicate the type of user: car driver or car passenger		X		X
E-TP-END	Trip confirmation panel	Form with text and buttons	Panel for the management of the post-trip operations	X	X	X	P
E-TP-FB	Overall feedback panel	Panel with 1 to 5 stars indicators	Panel for the provision of the overall feedback on the Journey Planning Service	X	X	X	X

Table 33 – Trip planning – Elements

4.1.4.7 Operations

Trip Planning		*OPERATIONS*	*Last revision: 21/10/2014*				
ID	**Operation**	**Description**	**Ref. Element**	**G**	**M**	**T**	**A**
O-TP-ODT	Textual indication of O/D	The user can type a text into the elements E-TP-OD	E-TR-OD	X	X	X	X
O-TP-ODAC	Indication of addresses as O/D with the support of auto-complete features	The user starts typing an address and an auto-complete function, supported by a Geo Coder is activated to suggest the complete and correct address	E-TP-OD	X	X	X	X
O-TP-ODPOI	Indication of mobility-related POIs as O/D	The user starts typing into E-TP-OD and an auto-complete function, supported by a	E-TP-OD	X	X	X	X

[2] This element will be shown to users upon user registration

	with the support of auto-complete features	MoveUs service is activated to suggest the complete and correct name of a mobility-related POI. The behaviour of such auto-complete function is integrated with the operation O-TP-ADAC which means that the results are presented all together as suggestions (though they can be conveniently separated for better readability) Mobility-related POIs can be, depending on the availability in each city: - Parking places - Bus stops - Other (Smart crossings, etc.) The POIs are automatically retrieved by the MoveUs platform.					
O-TP-ODP	Suggestion of past trips as O/D	Once the user focuses on an O or D field (E-TP-OD) the past locations, retrieved by a MoveUs service, are presented in a list as suggestions.	E-TP-OD	X		X	-[3]
O-TP-MT	Indication of a mode of transport	The user modifies the status of E-TP-MT to indicate one or more modes of transport for the trip request.	E-TP-MT	X	X	X	X
O-TP-CAL	Indication of a calendar	The user modifies the status of E-TP-TC to indicate a date and time to be considered in the trip request.	E-TP-TC	X		X	X
O-TP-ROS	Route options selection	The user selects the options for the route: fastest, shortest etc.	E-TP-RO	X	X	X	X
O-TP-MPML	Pick a mobility location from the map to be used as O/D	The user opens the map (E-TP-IM) using the Map Picker buttons (E-TP-MP). All geo-referenced mobility locations available for the city (e.g. Parking places, bus stop	E-TP-IM E-TP-MP	X	X		X

[3] Unless managed only within the app storage or environment

		points, smart crossings) are shown as icons on the map (Alternatively a selector will be available to show only specific types of mobility locations) The user can select an icon of a mobility location and confirm. The coordinates of the mobility location are retrieved and considered as origin or destination (depending on the chosen map picker). The O/D form is shown with the new selection.					
O-TP-TSUB	Trip request submission	The trip request is submitted to the system with the data indicated in the O/D form	E-TP-RS	X	X	X	X
O-TP-STU	Selection of the type of user of the service	In the specific case that the user selects the trip by car from E-TP-TP. Following the transport mode selection, the user will be asked to select the type of vehicle user: driver or passenger; if no option is selected by the user, the role indicated in the registration form will be considered by default. Otherwise, the driver role will apply.	E-TP-UTS		X		P
O-TP-CP	Visualization of car pooling options	Based on the data indicated in the O/D form, when applicable, possible car-pooling options, compatible with the indicated O/D are retrieved according to the configurable matching criteria. The solutions are displayed in E-TP-CP The carpooling options are selectable by the end user who will be redirected to the City-specific local Car-Pooling	E-TP-CP	X		X	P[4]

[4] A minimum level of trip matching may be envisaged without considering the car pooling preferences for anonymous users

		system.					
O-TP-FT	Visualization of found trip solutions	Based on the data indicated in the O/D form more trip solutions are searched and found by the MoveUs Platform. The results (found trip solutions) are displayed in E-TP-TP. The visualization, for each trip solution includes: • Trip summary • Energy consumption • Incentives associated • Etc.	E-TP-TP	X	X	X	X
O-TP-CAR	Visualization of alternatives routes to the CAR mode of transport	In the case the user has selected to travel only by car, the MoveUs platform will also provide the application with at least one alternative route with other greener mode of transport. This operation will not apply to those users whose vehicle has been registered in E-UR-VE form and tagged as eco efficient vehicle.	E-TP-MT		X		X
O-TP-TSEL	Selection of trip solution and request for trip details.	The user selects one of the found trip solutions from E-TP-TP. Following the selection, the details of the trip are requested and retrieved by the MoveUs platform. This includes: • Step-by-step instructions (e.g. turn-by-turn indications for car trips, or the details of the trip segments[5] for Public Transport, etc.) • The geo-coded data	E-TP-TP	X	X	X	X

[5] A segment is defined as a single part of the trip than can be covered from an interchange (or start) point to the next interchange (or end) point.

		necessary for a graphical representation of the trip: from a minimum set of coordinates (for interchange points or turn-by-turn instructions) to a more detailed graphical representation (shape) of the journey. Following this step, the textual visualization of the trip (O-TP-TEXT) is activated.					
O-TP-TEXT	Visualization of trip details as textual elements	The textual details of the trip are displayed: • For car, bike (including public bike hiring) or walk mode: ○ turn-by-turn instructions. This can include, for each instruction, a graphical representation of the operation (e.g. turn left, turn right etc.). ○ route distance ○ estimated time of route travel • For public transport and public bike hiring mode: the details of each single trip segment in terms of: ○ time and place (e.g. bus stop, bike pick up stations) of	E-TP-TI	X	X	X	X

		departure ○ time and place of arrival (bus stops, bike parking and drop off stations, etc.), ○ bus route (line) ○ distance ○ estimated time of route travel ○ applicable PT services ○ other data relevant for the interchanges and the overall journey. The single elements (segments for PT mode, public bike mode and single instructions –if possible- for car, bike and walk mode) are selectable.					
O-TP-TEXTCAR	Visualization of car trip specific details as textual elements	The textual details specific of the car trip are displayed: • Advanced eco-friendly traffic information like restricted access areas, traffic calming zones, etc.	E-TP-TICAR		X		-
O-TP-FBSEL	Visualization of feedback commands for single trip segments	Near the information of each segment (E-TP-TI), a command for providing a feedback to each single segment is shown.	E-TP-TI	X		X	X
O-TP-TEXTSEL	Selection of a textual element from the trip details panel	The selection of a single element of the E-TP-TI element opens the map visualization related to the specific element: • For car or walk mode	E-TP-TI E-TP-IM	X	X	X	X

		the graphic details of the instructions are shown. • For car: the selection of a single element of the E-TP-TICAR element opens the map visualization related to the specific element of the trip by car (graphic details of the instructions are shown • For public transport mode, the graphical representation of the trip segment is provided.					
O-TP-SFB	Provision of detailed feedback for a segment	By selecting the command for providing a feedback to each single segment (O-TP-FBSEL), a panel (E-TP-FBS) opens for the provision of feedback information on the single segment. The feedback is composed by Boolean values about the correctness on: • Destination information, • Last mile information, • Start time information, • Start position information, • Arrival time information, • Arrival position information. The previous information refers to the specific segment	E-TP-FBS	X		X	X
O-TP-MAP	Visualization of trip details on a map	The graphical details of the trip are displayed on a map. This includes: • Car and walk mode:	E-TP-IM	X	X	X	P[6]

[6] Car mode details are restricted to registered users

		Start and end points as well as the shape of the trip • Public transport mode: Start and end points of each trip segment (interchange points) • Car mode: the location of traffic calming zones, the recommended speed, the location of restricted access areas or roads to vehicles, the type of vehicles with right of access, etc. In all cases the relevant points (start, interchange, end points) are represented as selectable icons.					
O-TP-MAPSEL	Selection of icons on the map	By selecting an icon on the map as shown in O-TP-MAP, the detailed information relevant for the corresponding point is shown. This is done by means of a caption or dialog component. The information that is shown is: • Walk or car mode: Turn-by-turn instructions • Public transport mode: instruction for start, end or interchange points as in the textual representation. • Car mode: Advanced traffic information	E-TP-IM	X	X	X	X
O-TP-SW	Switching from map to text visualization	By using a dedicated button on the Toolbar E-TP-TB, the user switches from the map-based visualization (O-TP-MAP) to the text-based	E-TP-TB	X	X	X	X

		visualization (O-TP- TEXT)					
O-TP-TRAF	Show RTTI information	During the trip execution, by using a dedicated button available on the toolbar E-TP-TB, the user opens the panels (map and text) that shows the real time traffic information relevant for (applicable to) the trip. The button will be permanently activated for vehicle passengers, although for drivers it will be activated only when the GPS detects that the car is stopped.	E-TP-TR		X		-
O-TP-RR	Confirmation or refusal of re-routing	The user will be automatically shown the icon of the traffic incident that significantly affects the selected route and will be able to confirm or refuse the option of re-routing by pressing the correspondent button (or by voice recognition). The re-routing confirmation /refusal buttons will be activated in the real time for vehicle passengers; for drivers, the buttons will be activated only when the GPS of the mobile application will detect the car has stopped.	E-TP-TIW		X		-
O-TP-WARN	Automatic RTTI information showing	During the trip execution, the traffic panel E-TP-TR is automatically showed in the mobile application so as to inform the user about the traffic warning affecting the route selected by the user, together with a button to confirm the option of re-routing, either by pressing the specific button or by voice recognition.			X		-
O-TP-TRACK	User position tracking	During the trip execution the position of the user is tracked at a timely basis (every 1 min, 5 min, 10 min etc.). Depending on the type of transport mode	-		X		X

		selected, the time interval for tracking will be set.					
O-TP-TFC	Trip features calculation	Based on measurements and calculations performed within the app and based on the position retrieved over the time, an aggregated information is computed to identify some features of the executed trip (e.g. distance covered, time, is likely a walk trip, is likely a PT trip etc.)	-	X	X		X
O-TP-END	End Journey	By using a dedicated button on the toolbar E-TP-TB, the user indicates that the journey is over. According to the applicable operations for the city, one or more of the next operations are executed.	E-TP-TB	X	X	X	X
O-TP-STOR	Trip confirmation and storage	The user can indicate if the data on the trip has to be stored on the MoveUs Platform. The data includes: • Actual execution of the trip (also based on operation O-TP-STOR) • Departure, end points • Mode of transport • Other data calculated in O-TP-TFC and/or O-TP-TRACK	E-TP-END	X	X	X	P[7]
O-TP-INC	Incentives management/ update	If applicable and based on the data calculated in O-TP-TFC and/or O-TP-TRACK the status of incentives is updated on the user's balance. The updated balance is shown to the user in the E-TP-END.	E-TP-END	X	X	X	-
O-TP-FB	Overall feedback provision	By selecting a dedicated button on the E-TP-END the user opens the element E-TP-FB where an overall feedback on the service can be provided. The feedback is	E-TP-END E-TP-FB	X	X	X	X

[7] In case of anonymous access the data has to be stored as big data

		composed by a number of 1 to 5 stars quality indicators on: • Quality of data • Response Time • Quality of service • User interface • Reliability		

Table 34 – Trip planning – *Operations*

4.1.4.8 Interaction with the MoveUs Platform Services

Trip Planning	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 29/09/2014*

Operation ID	**MoveUs Service**	**Data Model Package**
O-TP-ODAC	ResolveAdddress (address, x,y)	External OSM geocoding format
O-TP-ODPOI	RequestStaticPoIInformation (position, [poiType]*). If position is unknown, MoveUs platform returns all the PoIs associated to the city.	PointOfInterest (EMotionFeature.PointOfInterest)
O-TP-ODP	RequestExistingTripsFromAutoLearn (UserId, origin)	User Management User Account.UsualTrips (MV_UsualTrips)
O-TP-ROS	RequestRoutePreferenceCriteria ()	ISO 19134 MultiModal Navigation.NavigationService. MN_RoutePreference
O-TP-TSUB	Road DynamicPublicTransportJourneyRoute (UserId, criteria, num_selection,start,end) // DynamicWalkingPlanning (UserId, criteria, num_selection start, end)// DynamicCyclingPlanning (UserId, criteria, num_selection start,end) // GetMultimodalPlanning (UserId, criteria, num_selection , start, end): [JP_Journey]*	Traveler Journey Assistance (JourneyPlanning.JP_Journey)
O-TP-CP	RequestCarPoolingOptions (UserId, TripRequestData): CarPoolingOptions	Registry. ExternalLocalServices, MV_CarPoolingTrips
O-TP-STU	GetDataOnMobility (UserId)	User Management. Mobility Preferences (MV-TransportRating.Role). Full list of options defined and updated on

		ApplicationConfiguration setup (Registry)
O-TP-CP	RequestCarPoolingOptions (UserId, TripRequestData):[CarPoolingTrips]*	PT Operation Management (PT Service.MV_CarPoolingTrips]
O-TP-FT	EnergyConsumptionStatusandSuggestions (UserId (registered or anonymous), trip solutions)	CF/EC Estimation
O-TP-CAR	DynamicPublicTransportJourneyRoute (UserId, criteria, num_selection,start,end) //DynamicWalkingPlanning (UserId,criteria, num_selection start, end)//DynamicCyclingPlanning (UserId,criteria, num_selection start,end) // GetMultimodalPlanning (UserId,criteria, num_selection , start, end): JP_LegTrack	Traveler Journey Assistance (JourneyPlanning.JP_Journey)
O-TP-TSEL	EnergyConsumptionStatusandSuggestions (UserId,, trip selection)	CF/EC Estimation
O-TP-SFB	SetFeedbackQuality (UserId, SegmentId, FeedbackCorrectness)	Feedback
O-TP-TRAF	GetDynamicRoadTrafficInformation (position, address or stop)	Traffic Management. RoadDataModel (Measured Data Publication)
O-TP-RR	SendTrafficFeedback (UserId, Incidence, pos)	Traffic Management (EMotionFeature.Incidence)
O-TP-WARN	SendTrafficFeedback (UserId, Incidence, pos)	Traffic Management (EMotionFeature.Incidence)
O-TP-TRACK	SetTravelerPosition (UserId, x,y)	PersonalMobilityData
O-TP-END	SendJourneyEndNotification(UserId,,Trip, Feedback)	Feedback

Table 35 – Trip planning – *Interaction with MoveUs platform*

4.1.5 Access to personal information

4.1.5.1 Description

This functionality allows to get the details on personal information and settings, indicated during the registration phase. This is also the access point for editing these.

The following data is included and may vary depending on the availability in the different cities:

- Username.
- Detailed information on gained incentives.
- Status (number) of Credits for each type.
- Date of last update.
- Status (balance) of incentives.
- Access to status (balance) of energy efficiency performance
- Mobility preferences and settings.

4.1.5.2 Anonymous access

The functionalities of this group are only available for registered users.

4.1.5.3 High level Analysis per City

No city-specific high-level analysis has been done for this sub-function.

4.1.5.4 Elements

Access to Personal Information	*ELEMENTS*	*Last revision: 05/09/2014*

ID	Name	Type	Description	G	M	T
E-PI-PIF	Personal information form	Text fields and buttons	The form is used to display the personal information. • Username. • Detailed information on gained incentives. • Status (number) of Credits for each type. • Date of last update. • Environmental/Energy consumption data. An edit button is also present to modify the values.	X	X	X
E-PI-INC	Incentives visualization form	Text fields and buttons	Element where incentives related information and preferences are shown	X	X	
E-PI-MOB	Mobility information and	Text fields and	Element where mobility information and preferences	X	X	X

	preferences visualization form	buttons	are shown. An edit button is also present to modify the values.			

Table 36 – Access to personal information – Elements

4.1.5.5 Operations

Access to Personal Information		*OPERATIONS*		*Last revision: 29/09/2014*		
ID	**Operation**	**Description**	**Ref. Element**	**G**	**M**	**T**
O-PI-OPEN	Summary and access buttons	Once the user enters the "Personal Information" function, a summary of the personal information is displayed.	E-PI-PIF	X	X	X
O-PI-INCB	Access to gained incentives	One button is added to E-PI-PIF to give access to the detailed information on gained incentives	E-PI-PIF	X	X	
O-PI-MOBB	Access to mobility-related information and preferences	One button is added to E-PI-PIF to give access to detailed information on mobility-related information and preferences. An edit button allows the user to modify the values (see 4.1.2)	E-PI-PIF	X	X	X

Table 37 – Access to personal information – *Operations*

4.1.5.6 Interaction with the MoveUs Platform Services

Access to personal information	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 29/09/2014*
Operation ID	**MoveUs Service**	**Data Model Package**
O-PI-01	GetDataOnMobility(UserId):MobilityPreferences RequestCouponDealsInformation (UserId): Execute(MV_incentiveBalance where assignedTo is UserId) RequestAwards(UserId)	User Management (Mobility Preferences (MV_TransportRatings) + Car Pooling Preferences (MV_CarPoollingProfile) + UsualTrips (MV_UsualTrips) Incentive (Assignment of Incentives)

Table 38 – Access to personal information – *Interaction with MoveUs platform*

4.1.6 Get information

4.1.6.1 Description

The Get information service can be intended as a number of location based services or functions that are activated from the main menu. Each service provides information on a specific domain among these covered by MoveUs. For instance, the public transport information service provides, in principle, information on:

- Bus stops (localized information).
- Line (route) information at the bus stop (if supported).
- Timetables at the bus stop.

By considering the bus stop object as the reference information and being this information geo-coded it is possible to make operations like:

- Use the object to determine its distance from the user position.
- Search objects that are near a certain (or own) position.
- Visualize graphically the object on a map.

Objects on other domain have a similar behaviour because they feature:

- A position (couple of coordinates).
- A set of additional information, specific for the domain.

The Get information service, therefore, can have the same basic structure and functions for all types of domains covered.

It can be noted that besides being accessible from the main menu, another way of accessing the Get Information service is from the Trip planning service (see 4.1.4.7). In this case a mechanism (for instance a selector) has to be implemented to determine exactly which domain-specific service to access. The purpose is to retrieve the position of a certain object in order to use it as a start or destination point.

Alternatively the Get information service itself, as described in the specification below, provides the possibility of automatically opening the Trip planning service by selecting a point as a start or destination location for the trip planning.

4.1.6.2 High-level analysis per City

HIGH LEVEL ANALYSIS	*City service:* ***Get Information***	*Last revision: 13/06/2014*
MoveUs High level Function: ***GET***		*Sub-function:* ***Location-Based Infomobility Service***
City	**Description**	
Genoa	Using a dedicated function, accessible from the main screen, the *end user* requests information in different mobility domains like public transport, parking etc. The user can indicate an address or POI which is resolved into geographical coordinates. The object indicated (for example the bus stops)	

	are displayed in the premises of the indicated address or POI.
Madrid	For Madrid it is foreseen that, once the user has been located by the GPS embedded in the mobile phone and sent to MoveUs platform, and if previously configured by the user, the application will automatically show the available information about different modes of transport available (i.e. location of nearby bike hiring facilities, location of nearby bus stops and bus lines, etc.) near his location, and also will show –mobility- events and POI of user's preference (like the location of smart crossings, etc.)
Tampere	The application will provide to the user the possibility to see based on its current position, information related with closest transportation modes (e.g. bus stops, bicycle parking places, city bike stands and public bike places), parking and EV charging places.
Notes	

Table 39 – Get information – High level analysis per city

The details of the mobility-related information that will be shown to the users are expected to be as follows:

Information domain	G	M	T
Public transport information	X	X	X
Bike sharing park information		X	X
Events	X	X	
POI	X	X	
Parking points	X		X
Traffic information	X	X	
Smart Crossing		X	

Table 40 – Resume of mobility-related information per city

4.1.6.3 Anonymous access

The possibility of implementing an anonymous access for this group of functionalities is expressed in details in the additional column ("A").

4.1.6.4 Elements

Get Information		*ELEMENTS*		*Last revision: 21/10/2014*			
ID	**Name**	**Type**	**Description**	**G**	**M**	**T**	**A**
E-GI-MAP	Interactive map	Map	Interactive map component that is used to show graphically the	X	X	X	X

			information and to obtain further details.				
E-GI-LIST	List of mobility-related objects	Text/ graphic area	List of objects (e.g. bus stops, parking places etc.) in a specific mobility domain.	X	X	X	X
E-GI-DET	Details of information on mobility-related elements	Text/ graphic area	Detailed textual information on a specific mobility-related element.	X	X	X	X
E-GI-TB	Main service toolbar available in E-GI-MAP and E-GI-LIST	Toolbar	Toolbar with buttons for the activation of operations.	X	X	X	X
E-GI-TBDET	Toolbar available in E-GI-DET	Toolbar	Toolbar with buttons for the activation of operations.	X	X	X	X

Table 41 – Get information – Elements

4.1.6.5 Operations

Get Information		*OPERATIONS*	*Last revision: 21/10/2014*				
ID	**Operation**	**Description**	**Ref. Element**	**G**	**M**	**T**	**A**
O-GI-LIST	Access to the list of objects	The main menu contains a command for activating the "Get Information" service in a specific domain The list of objects of a specific domain is automatically opened by selecting the associated command from the main menu. The objects are retrieved based on the active City. The selection of the active City, as already described, is possible according to one of the following methods: a) automatic detection, b) manual selection c) use of a preference as default City	E-GI-LIST	X	X	X	P[8]

[88] The default city from the user preferences won't be available in the case of anonymous access

		Based on the above criteria the list contains objects sorted by distance from the: a) current position of the user or, **b)** (if the user is not physically in the City) a default position (for instance a chosen central point on the city). Each element of the list contains summarized information of the single entry. Additionally, the distance from the reference point is shown. Each entry is clickable. By selecting an entry the detailed information is shown in E-GI-DET. Summary information available:					
		• Public transport information: the name of the bus stop		X	X	X	X
		• Traffic incidents information: a name for the traffic incident.		X	X		X
		• Bike sharing park information: the name or location of the bike sharing park and public bike places.			X	X	X
		• Events: a title for the event, including traffic events		X	X		X
		• POI: the name of the POI		X	X		X
		• Parking points: the name of the parking place		X		X	X

		• Smart crossings:, name of reference streets, SafeCross implemented or not			X		X[9]
O-GI-MAP	Access to the map view	The map view is activated when the user selects the appropriate button from the toolbar located behind the list view (see O-GI-TB). The map shows the icons for objects near the current active location (user position or searched address – see also the other operations of this service) Pan and zoom features are available. Each icon is selectable. By selecting an icon the detailed information is shown in E-GI-DET.	E-GI-MAP	X	X	X	X
O-GI-DET	Access to detailed information	A panel opens following the appropriate commands (see the other operations of this service) to show the details of the selected element. Detailed information (further details or features for each domain in each city can be supported and available differently):		X	X	X	X
		• Public transport: Stop line, timetable (next transits) and line information		X	X	X	X
		• Traffic information: details on the traffic incidents: works on road, access restrictions, etc.		X	X		X
		• Bike sharing park information: the name of the bike sharing park, total and free places plus additional			X	X	X

[9] This information can be displayed to anonymous user, but the user will not be able to make use of the smartcrossing service.

		applicable information					
		• Events: a title for the event plus a description and link to detailed information, including traffic events.		X	X		X
		• POI: the name of the POI plus additional applicable information		X	X		X
		• Parking: parking name, free and total parking places, tariffs, opening times		X		X	X
		• Smart crossings: name of reference streets, SafeCross implemented or not			X		X
O-GI-TB	Use of the main toolbar	The toolbar E-GI-TB is located behind the map and the list view (depending on the active view) and contains the buttons necessary to perform the following operations: • Commuting from map to list view: the same set of objects are represented on the map or on a list • Search for a location (address or POI if supported) and find objects near that location: in this case a text box opens and the user can insert a location. This can be supported by auto-complete features implemented together with a (external or MoveUs-based) geo-coding service like for the trip planner. Once confirmed, a new object search is performed and a new list or set of icons on	E-GI-TB	X	X	X	X

		the map is shown • Find objects near that current user location: if the user position is no longer considered as a reference location (for instance because a different address is searched) the user can return to his position and the objects near the position are searched again.					
O-GI-TBDET	Use of the detail toolbar	The toolbar E-GI-TBDET is located behind the details panel and contains the buttons necessary to perform the following operations: • Update the information (reload button) • Select the element as a start or destination point for a trip planning. By selecting this command the Trip planning service (O/D form) is automatically opened and filled in with the start/end place selected.	E-GI-TBDET	X	X	X	X

Table 42 – Get information – *Operations*

4.1.6.6 Interaction with the MoveUs Platform Services

Get Information	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 29/09/2014*
Operation ID	**MoveUs Service**	**Data Model Package**
O-GI-LIST	GetPoIInformation (position): [PoIInfromation]* GetDynamicPoIInformation (Point of interest (category, location, validity time period): [PoIDynamicInformation]*	Point Of Interest (EMotionFeature.PointOfInterest)

Table 43 – Get information – *Interaction with MoveUs platform*

4.1.7 Traffic Feedback provision

4.1.7.1 Description

The provision of feedback information by the End Users is a community-based method of enriching the available mobility data. The users have the possibility of providing an information (feedback) based on their experience and observation on:

a. The information received with an existing service: in this case the feedback is an evaluation on the quality of the information (or overall service) itself.
b. A traffic situation observed on the road to be notified to the community or the traffic information center.

In the first case the feedback can be collected, through the MoveUs platform and interface[10], by different actors of the MoveUs value chain, primarily:

- The local data provider or stakeholder, who owns the original information delivered to the user (and against which, the user formulated the feedback) In this case the feedback can be used to improve the information at the source.
- The service provider who delivers the information. In this case the feedback can be used to detect and correct possible situations where the information is not correctly delivered to the user.

The provision of feedback on the quality of information and overall quality of service is a feature integrated into the Trip planning service and has been described within the appropriate context in 4.1.44.1.4. In the following, the traffic-related feedback provision function is considered.

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For the traffic feedback provision, the notification of a traffic-related situation is foreseen and can be primarily sent to the traffic information center. Here the notification is evaluated and validated[11] (possibly by using several feedbacks of the same type) and then eventually used to build a new traffic event or to update or improve an existing one.

4.1.7.2 High level Analysis per City

Not required.

4.1.7.3 Anonymous access

The provision of traffic event feedback is available for anonymous users. Nevertheless it can be considered in the future as one possible incentive option, to associate the provision of a feedback to the assignment of incentives. In this case the user registration is required.

[10] The MoveUs data model includes a number of feedback-related data structures
[11] See for example the tool for crowd-sourced feedback validation in Genoa in 5.1

4.1.7.4 Elements

Feedback Provision	*ELEMENTS*	*Last revision: 29/09/2014*

ID	Name	Type	Description	G	M	T
E-FB-FRM	Feedback provision form	Text fields and buttons	The form is used to offer the end user the possibility of providing all necessary details of an observed traffic situation. It comprises: • The relevant geographic data (position of the observed situation, automatically retrieved by a geocoder or indicated by the user with a click on the map. The current user position can also be used) • The type of traffic event, available according to the relevant enumerations defined in the MoveUs data model. A further simplification can be also envisaged (e.g. possible values can include: slow traffic, incident, blocked traffic, weather event, road works) • A free-text comment. The date and time information is automatically retrieved and added to the feedback data.	X		

Table 44 – Feedback provision – *Elements*

4.1.7.5 Operations

Feedback Provision	*OPERATIONS*	*Last revision: 29/09/2014*				
ID	**Operation**	**Description**	**Ref. Element**	**G**	**M**	**T**
O-FB-OPEN	Access to the service	By clicking on the appropriate entry on the main menu, the E-FB-FRM opens.	E-FB-FRM	X		
O-FB-EDIT	Enter traffic data	By using the elements of E-FB-FRM, the user enters the detailed data of the observed traffic situation	E-FB-FRM	X		
O-FB-SEND	Submit feedback	By using the submit button, the data is completed with the current date and time and the message is sent to the MoveUs platform via the appropriate MoveUs interface method.	E-FB-FRM	X		

Table 45 – Feedback provision – *Operations*

4.1.7.6 Interaction with the MoveUs Platform Services

Feedback Provision	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 29/09/2014*
Operation ID	**MoveUs Service**	**Data Model Package**
O-GI-LIST	GetPoIInformation (position): [PoIInformation]* GetDynamicPoIInformation (Point of interest (category, location, validity time period): [PoIDynamicInformation]*	Point Of Interest (EMotionFeature.PointOfInterest)

Table 46 – Feedback provision – *Interaction with MoveUs platform*

4.1.8 Electronic Wallet Service

4.1.8.1 Description

The electronic wallet service, described in the Use Cases definition for the City of Genoa, retrieves the available external Payment systems available for the City and gives the possibility of using them by opening the web browser with the URL associated to the system.

4.1.8.2 Anonymous access

This service is available for anonymous users.

4.1.8.3 Elements

Electronic Wallet Service	*ELEMENTS*	*Last revision: 29/09/2014*				
ID	**Name**	**Type**	**Description**	**G**	**M**	**T**
E-EW-LIST	List of external services	List of clickable elements	The list contains the name, description and URL or the available external payment services available for the City.	X		

Table 47 – Electronic Wallet Service - *Elements*

4.1.8.4 Operations

Feedback Provision	*OPERATIONS*	*Last revision: 29/09/2014*				
ID	**Operation**	**Description**	**Ref. Element**	**G**	**M**	**T**
O-EW-LIST	Get and display the information on local payment services	The list of payment systems available for the active City is retrieved and displayed. By clicking an element the user is redirected to the URL of the external system.	E-EW-LIST	X		

Table 48 – Electronic Wallet Service – *Operations*

4.1.8.5 Interaction with the MoveUs Platform Services

Electronic Wallet Service	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 29/09/2014*
Operation ID	**MoveUs Service**	**Data Model Package**
O-TP-CP	RequestAvailablePaymentSystems (City): [ExternalLocalServices]*	Registry. ExternalLocalServices

Table 49 – Electronic Wallet Service – *Interaction with MoveUs platform*

4.2 Web-based tools for the management of incentives

4.2.1 General concepts

Incentives is the term used to shortly and generically indicate the concepts, elements and features introduced in MoveUs in relation to the use of incentives, coupons, awards, vouchers and advertisement. The functional model of the incentives is introduced in the project Deliverable D2.2.

The main concepts can be resumed in a few points that will be described more in depth within the specification of the single web tools:

- The end users can gain **Incentives** based on his behavior.
- More types of incentives and **Rules** associated to them 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**

More categories of users with different profiles and privileges are defined in relation to the previous operations:

- **Type 1 (UT1)**: Entity defining RULES
- **Type 2 (UT2)**: Entity providing INCENTIVES
- **Type 3 (UT3)**: Entity where INCENTIVES can be spent, entity providing awards (benefits that can be obtained with a certain amount of incentives)
- **Type 4 (UT4)**: Final users
- **Type 5 (UT5)**: Entity providing COUPONS. They can be:
    - **UT5_MoveUs:** users that use a MoveUs input tool to insert COUPONS items
    - **UT5_EXT:** users that provide COUPONS items automatically via a MoveUs interface specifically available for this purpose
- **Type 6 (UT6):** Entity providing ADVERTISEMENTS
    - **UT6_MoveUs:** users that use a MoveUs input tool to insert ADVERTISEMENTS items
    - **UT6_EXT:** users that provide ADVERTISEMENTS items automatically via a MoveUs interface specifically available for this purpose

The detailed operations in the Incentives domain are described by the component diagram in the following figure.

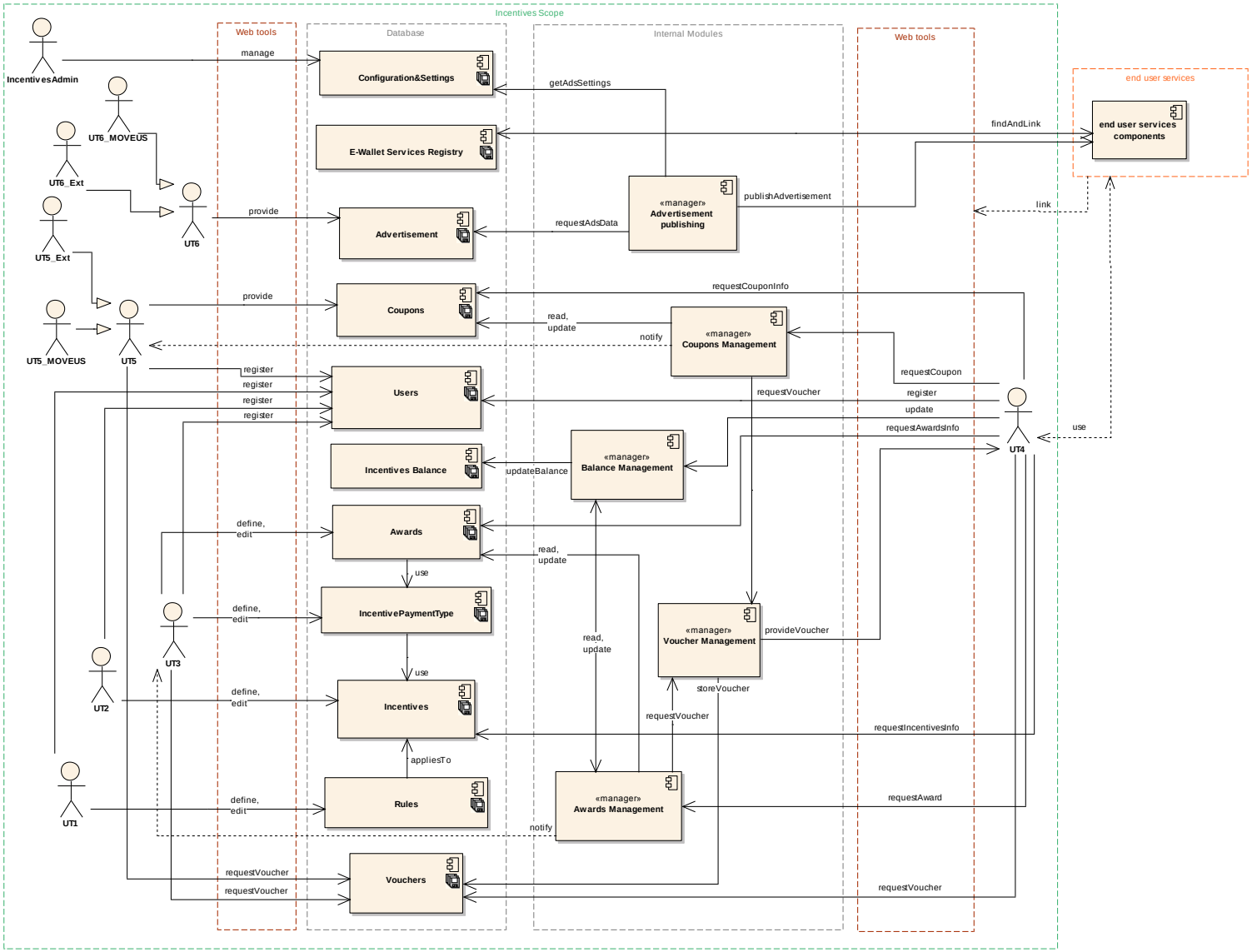

Figure 2 – MoveUs incentives system – Component diagram

4.2.1.1 The web tools

The web-based tools for incentive management are instruments that can be used to manage all data and operations related to the incentives. Considering the requirements and the elements that have to be managed, the following main functionalities are identified as essential for the web-based tools:

1. **User Registration.**
   The user types that can get registered to MoveUs by using these tools are the following: UT1, UT2, UT3, UT5, UT6. The end user (UT4) is registered within the scope of the MoveUs mobile app and using the functionalities described for it.
2. **Management of Rules**
   Functions to insert, edit and delete rules (UT1)
3. **Management of Incentives**
   Functions to insert, edit and delete incentives (UT2)
4. **Management of Incentive Payment Types**
   Functions to insert, edit and delete types of payment based on incentives (UT3)
5. **Management of Awards**
   Functions to insert, edit and delete items of the awards catalogue (UT3)
6. **Management of Coupons**
   Functions to insert, edit and delete coupons (UT5)
7. **Management of Advertisement items**
   Functions to insert, edit and delete advertisements (UT6).
8. **Access to information on available Incentives, Rules, Awards & Coupons.**
   Tool that allows a read-only access to: available incentives, rules, coupons, awards.
9. **Request of Awards**
   Tool for the management of requests of awards from UT4
10. **Request of Coupons**
    Tool for the management of requests of coupons from UT4.
11. **Voucher Retrieval**
    Tool for retrieving details on issued vouchers by UT3, UT4 and UT5
12. **Administration tools**
    Tools for the management and configuration of incentive-related parameters.

4.2.1.2 Anonymous access

Each of the above functionalities is accessible only by means of credentials with the exception of the user registration.

The registered users are activated by an administrator with the appropriate administration tool.

4.2.1.3 Technological notes

Like for the remaining part of the present document, the technical specification of the incentive web tools is technologically neutral.

The tools shall be available on desktop or mobile clients and in certain cases will be linked directly from the MoveUs common mobile application.

For this reason the reference technological solution of the tools is a HTML-CSS-Javascript framework for mobile devices. This will make the tools linkable and efficiently usable from the MoveUs mobile app as well as from a web-desktop workstation[12].

4.2.2 User Registration

4.2.2.1 Description

The web tool user registration allows the users that belong to one of the MoveUs incentives-related category to submit a registration request.

4.2.2.2 Elements

Incentives – User Registration		*ELEMENTS*		*Last revision: 29/09/2014*		
ID	**Name**	**Type**	**Description**	**G**	**M**	**T**
E-INC-REG	User registration	Text fields and buttons	The form is used to offer the user the possibility of registering to the MoveUs system. The user registration form includes all fields and parameters that are defined for each User Type in the Data Model Specification (Deliverable D3.1) except the User type 4 (UT4)	X	X	X

Table 50 – Incentives – User registration - Elements

[12] Some tools like the administration tools may be realized without the support of the mobile framework.

4.2.2.3 Operations

Incentives – User Registration	*OPERATIONS*	*Last revision: 29/09/2014*			
ID	**Operation**	**Description**	**Ref. Element**	**G**	**M**	**T**
O-INC-ACC	Access to the service	The registration facilities are accessible by means of a username and password whenever required by the management policies. These policies define the user types that can get registered automatically (without the control of a MoveUs administrator).	E-INC-REG	X	X	X
O-INC-EDIT	Enter registration data	By using the elements of E-INC-REG, the details of the registration can be entered.	E-INC-REG	X	X	X
O-INC-SEND	Submit	By using the submit button, the data is sent to the MoveUs platform via the appropriate MoveUs interface method. The data is automatically validated but a tool for validating and activating the user may be also envisaged.	E-INC-REG	X	X	X

Table 51 – Incentives – User Registration - Operations

4.2.2.4 Interaction with the MoveUs Platform Services

Incentives- User Registration	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 18/09/2014*
Operation ID	**MoveUs Service**	**Data Model Package**
O-INC-EDIT	UserRegistration (AuthN UserId, DeviceId, PWD): Session token	IAM credentials

Table 52 – Incentives – User Registration - Interaction with the MoveUs Platform Services

4.2.3 Management of Rules

4.2.3.1 Description

The **Rules** define the mechanisms that regulate the automatic assignment of incentives to the final user.

The MoveUs data model (deliverable D3.1) defines the structure and composition of a rule by means of a super-class with a base profile including a temporal and spatial validity. Then the sub-classes define how many incentives are rewarded for a certain situation, behaviour or action. Since a limitless number of such situations, behaviour or actions could be defined, at the present stage and for the experimental purposes of the project two sub-rules are defined and will be managed by the web tools, namely these are called:

- ***Smart mobility rule***: defines how many incentives can be gained if the user covers a certain distance with certain modes of transport and in specific timeslots.
- ***Feedback rule***: defines how many incentives can be gained if the user provides a number of feedbacks of a certain type.

In short, the definition of the **rule** by means of the web tools is done by a registered user of type 1 defining:

I. A set of basic data (name, description, geographical and temporal validity of the rule)
II. Specific data for one of the two types of rule: a. smart mobility or b. feedback provision:
    a. Reward, distance, mode of transport, timeslots
    b. Reward, type of feedback, number of feedbacks

4.2.3.2 Elements

Incentives – Management of Rules	*ELEMENTS*		*Last revision: 29/09/2014*			
ID	**Name**	**Type**	**Description**	**G**	**M**	**T**
E-INC-RL	Rule List	List and buttons	List of the rules is shown for the logged-in user. Only the rules owned by the user are shown. An edit button is present near each rule to edit the rule. A delete button is present near each rule to delete the rule. A new rule button is present to insert a new rule.	X	X	X
E-INC-RF	Rule edit	Text fields and buttons	Form for editing a rule	X	X	X
E-INC-RLO	Log out	Button	Button for logging out	X	X	X

Table 53 – Incentives – Management of rules - Elements

4.2.3.3 Operations

Incentives – Management of Rules	*OPERATIONS*	*Last revision: 29/09/2014*			
ID	**Operation**	**Description**	**Ref. Element**	**G**	**M**	**T**
O-INC-RL	Access to rule elements	The rules owned by the logged-in user are shown.	E-INC-RL	X	X	X
O-INC-RD	Delete a rule	The user presses the *delete* button near the rule. If at least an incentive associated to the rule is present, a message appears to warn the user that the related incentives must be deleted first. If the rule can be deleted a message appears to ask the user about the actual willingness to delete the item. If the user confirms, the rule is deleted from the DB. The list of rules is updated	E-INC-RL	X	X	X
O-INC-RE	Edit an existing rule	The user presses the edit button near the rule. The rule edit form opens with the existing values	E-INC-RL E-INC-RF	X	X	X
O-INC-RN	Edit a rule	The rule edit form opens when the user presses the new rule or edit buttons. The user can insert or modify the values and confirm the submission.	E-INC-RF	X	X	X
O-INC-LOG	Logout	By pressing the E-INC-RLO button the user get logged out.	E-INC-RLO	X	X	X

Table 54 – Incentives – Management of rules – Operations

4.2.3.4 Interaction with the MoveUs Platform Services

Incentives- Management of Rules	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 18/09/2014*
Operation ID	**MoveUs Service**	**Data Model Package**
O-INC-RL	RequestOwnedRules (UserId): [MV_I_Rule_Basic]*	Incentive.Incentives and Rules

O-INC-RD	RemoveRule (UserId, RuleId): ACK/NACK	Incentive.Incentives and Rules
O-INC-RN	UpdateRule(UserId, RuleDesc): ACK/NACK	Incentive.Incentives and Rules

Table 55 – Incentives – Management of rules - Interaction with the MoveUs Platform Services

4.2.4 Management of Incentives

4.2.4.1 Description

An **incentive** is defined by means of

- One or more applicable **rules** that define *how* the incentives can be gained by the user.
- A **currency:** a more specific unit of measure of the incentives, associated both to the way the incentive is gained and to the possibility of spending it.

Therefore, the specification of the incentives can be achieved completely if the above elements are defined completely.

By using the web tools, the specification of rules and currencies is achieved as follows:

- The specification of rules is done in the module described in 4.2.3
- The specification of currencies is done with the present web tool.

Definition of currencies

Only a user of type 2 (incentive provider) can define the currencies.

A limitless number of currencies can be defined but every currency must be based on one of these base types:

Base Currency	**Type of incentive for which the base Currency is used**
M_COIN (MoveUs Coin)	Incentives that can be spent in general at more UT3s associated to MoveUs
B_COIN (Bonded Coin)	Incentives that can be spent only at one specific UT3
CREDIT	Incentives that are calculated from energy efficiency related behaviours and can be spent at more UT3s

Table 56 - Measure/Currency units

The **currency** is defined with a sub-functionality of the tool for the management of the incentives by specifying:

I. A custom name
II. The base currency
III. The monetary value of the currency
IV. The time validity
V. The geographic validity

Definition of incentives

The definition of the **incentive** is defined with the tool for the management of the incentives by specifying:

I. The basic data of the incentive (name, description)
II. The applicable currency (selection from the available currencies)
III. The rule(s) to be followed (selection from the available rules)

NOTE 1: The users of type UT2 can create an incentive and edit/delete only their own incentives.

NOTE 2: The users of type UT2 can create a currency and edit/delete only their own currencies if these are not associated with any existing incentive (in this case the incentive must be deleted first)

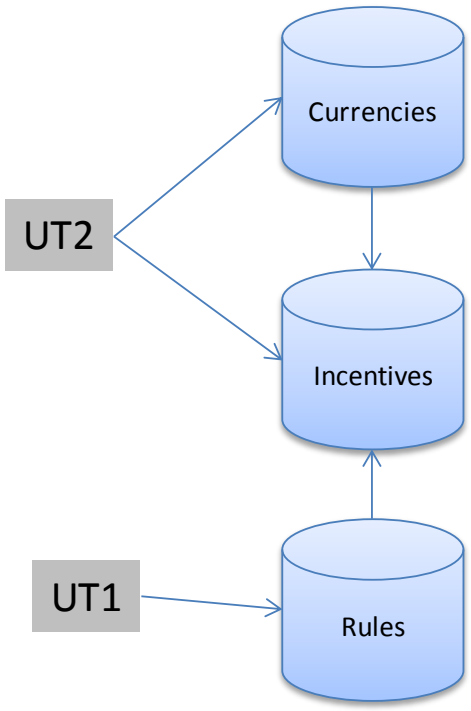

Figure 3 – Definition of incentives and rules

4.2.4.2 Elements and operations

The elements and operations definitions for this functionality are similar to those specified for the management of rules (sect. 4.2.3) because, exactly like for the above case, the following features are present:

- a list of items is shown with edit and delete buttons
- an edit form is present to insert and modify the items
- restrictions for delete and edit operations have to be applied following the notes specified in the description of this function (above)
- the logout facility is present

In this case a feature (button) for switching from the incentive edit and currency edit functions must be introduced.

4.2.4.3 Interaction with the MoveUs Platform Services

Incentives- Management of Currencies	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 18/09/2014*

Operation ID	**MoveUs Service**	**Data Model Package**
O-INC-CL	RequestCurrencies (UserId): [Currencies]* : [MV_IncentiveCurrency]*	Incentive.Incentive Currencies
O-INC-CD	RemoveCurrency (UserId, CurrencyId (ID:int)): ACK/NACK	Incentive.Incentive Currencies
O-INC-CU	UpdateCurrency (UserId, CurrencyDesc) : ACK/NACK	Incentive.Incentive Currencies
O-INC-CN	CreateCurrency (UserId, CurrencyDesc (MV_IncentiveCurrency) : ACK/NACK	Incentive.Incentive Currencies

Incentives- Management of Incentives	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 18/09/2014*

Operation ID	**MoveUs Service**	**Data Model Package**
O-INC-IL	RequestIncentiveList (UserId): [MV_Incentive]*	Incentive.Incentive
O-INC-ID	RemoveIncentive (UserId, IncentiveId (ID:int)): ACK/NACK	Incentive.Incentive
O-INC-IU	UpdateIncentive (UserId, IncentiveDesc): ACK/NACK	Incentive.Incentive
O-INC-IN	CreateIncentive(UserId, Currency (Id: int), Rules : [Id: int]*) : ACK/NACK	Incentive.Incentive

Table 57 – Incentives – Management of currencies and incentives - Interaction with the MoveUs Platform Services

4.2.5 Management of Incentive Payment Types

4.2.5.1 Description

The gained incentives can be spent to get benefits that are called **awards**. These can be requested to users of type 3.

To obtain an award the concept of **payment** (by means of incentives) is introduced. In order to support the payment operation efficiently, an entity called *incentive payment type* is defined.

This feature extends the concept of currency by adding a monetary trade-off. This trade-off expresses the percentage that could be applied to pay an award partially in incentives and partially in real money.

> **Example**:
>
> An instance of *IncentiveCurrency* named "CustomCoin" is of type "B_COIN", and each coin has a value of 1 euro.
>
> An instance of *IncentivePaymentType* has the value of "CustomCoin" and additionally has a monetary tradeoff of the 50%.
>
> An award of value = 100Euro can be then obtained with 100 "CustomCoin" or with 50 "CustomCoin" + 50 Euros.

Definition of Incentive Payment types

There is a dedicated web tool, usable by users of type 3, for the definition of **incentive payment types**. This definition is achieved by specifying:

I. An applicable currency (selection from the available currencies)
II. The monetary trade-off
III. The temporal validity

NOTE: With this tool, users of type UT3 can view, edit and delete incentive payment types defined by themselves and not by other users. Edit and delete operations are allowed only if the incentive payment type is not already associated to an existing award. In order to delete an incentive payment type the associated awards have to be deleted first.

4.2.5.2 Elements and operations

The elements and operations definitions for this functionality are similar to those specified for the management of rules (sect. 4.2.3) because, exactly like for the above case the following features are present:

- a list of items is shown with edit and delete buttons
- an edit form is present to insert and modify the items
- restrictions for delete and edit operations have to be applied following the notes specified in the description of this function, above
- the logout facility is present

4.2.5.3 Interaction with the MoveUs Platform Services

Incentives- Incentive Payment Types	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 18/09/2014*

Operation ID	**MoveUs Service**	**Data Model Package**
O-INC-PL	RemoveIncentivePaymentType (UserId, IncentivePaymentTypeId (ID:int))	Incentive.Incentive Payment Type
O-INC-PD	RemoveIncentivePaymentType (UserId, IncentivePaymentTypeId (ID:int))	Incentive.Incentive Payment Type
O-INC-PU	UpdateIncentivePaymentType(UserId, IncentivePaymentDesc)	Incentive.Incentive Payment Type
O-INC-PN	CreateIncentivePaymentType(UserId, IncentivePaymentDesc)	Incentive.Incentive Payment Type

Table 58 – Incentives – Management of incentives payment types - interaction with the MoveUs Platform Services

4.2.6 Management of Awards

4.2.6.1 Description

The web tool for the management of **awards** allows the definition and management of items collected in a **catalogue** that can be viewed, requested and obtained by users of type 4 in exchange of a certain amount of incentives.

The **award** item is defined by users of type 3 by specifying:

I. The name, description, temporal and geographical validity
II. The current availability (amount of awards available)
III. The monetary value
IV. The associated incentive payment type
V. The applicable incentives

NOTE 1: For edit and delete operations of an award, different policies can be applied. It can be assumed that an award can be modified and deleted also before the end of its temporal validity. This option can be anyway changed or even controlled by a global setting configured by the administrator.

NOTE 2: With this tool, only the incentive payment types defined by a certain UT3 can be visible and applicable to the awards defined by the same UT3.

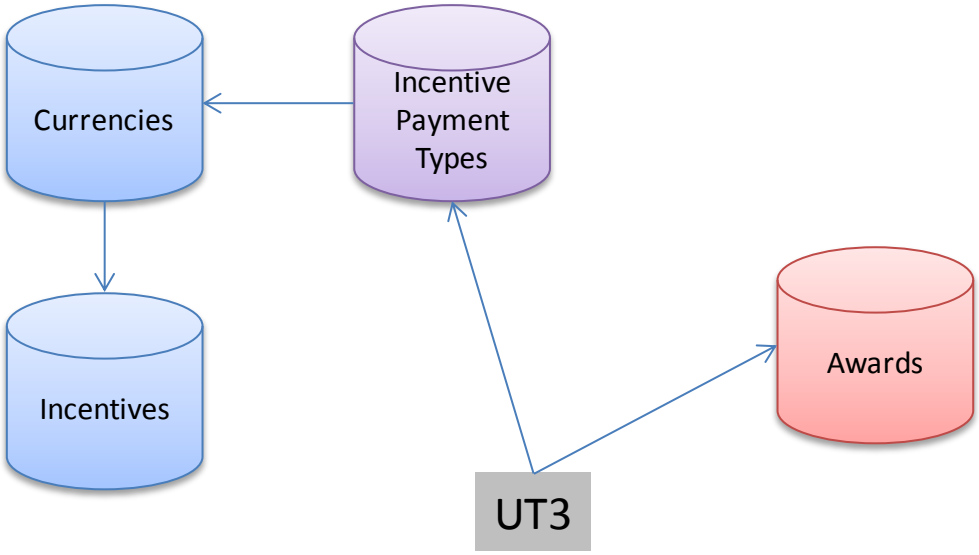

Figure 4 – Definition of awards and related payment types

4.2.6.2 Elements and operations

The elements and operations definitions for this functionality are similar to those specified for the management of rules (sect. 4.2.3) because, exactly like for the above case the following features are present:

- a list of items is shown with edit and delete buttons
- an edit form is present to insert and modify the items
- restrictions for delete and edit operations have to be applied following the notes specified in the description of this function above
- the logout facility is present

4.2.6.3 Interaction with the MoveUs Platform Services

Incentives- Awards	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 18/09/2014*
Operation ID	**MoveUs Service**	**Data Model Package**
O-INC-AL	CreateAwards (UserId, Award)	Incentive.Awards
O-INC-AD	RequestAwardList (UserId): [MV_Awards]*	Incentive.Awards
O-INC-AU	RemoveAwards (UserId, AwardId (ID:int))	Incentive.Awards
O-INC-AN	UpdateAwards (UserId, IncentiveDesc)	Incentive.Awards

Table 59 – Incentives – Management of awards - Interaction with the MoveUs Platform Services

4.2.7 Management of Coupons

4.2.7.1 Description

The definition of coupon items by users of type UT5 follows similar rules than the awards. Nevertheless, the coupons have to be intended as an element of future financial sustainability for MoveUs. By definition, the coupons are not directly obtainable by the end users if they provide an amount of gained incentives (in this case the definition of award applies). Instead, the coupons are visible to UT4 (if they accept this feature) and can be requested and obtained by paying them in real money in a way that is totally external to MoveUs.

A voucher can be issued either by the providers of the coupons with their own system or by the MoveUs voucher provider if the providers of the coupons do not have this facility.

The **coupon** item is defined by specifying:

I. All properties and attributes as specified in the data model (D3.1) for the incentives package that describes the coupon completely

NOTE 1: For edit and delete operations of a coupon, different policies can be applied. It can be assumed that a coupon can be modified and deleted also before the end of its temporal validity. This option can be anyway changed or even controlled by a global setting configured by the administrator.

4.2.7.2 Elements and operations

The elements and operations definitions for this functionality are similar to those specified for the management of rules (sect. 4.2.3) because, exactly like for the above case the following features are present:

- a list of items is shown with edit and delete buttons
- an edit form is present to insert and modify the items
- restrictions for delete and edit operations have to be applied following the notes specified in the description of this function above
- the logout facility is present

4.2.7.3 Interaction with the MoveUs Platform Services

Incentives- Coupons	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 18/09/2014*
Operation ID	**MoveUs Service**	**Data Model Package**
O-INC-CL	RequestCouponList (UserId, CouponId (ID:int)): [CouponDesc]*	Incentive.Coupons

O-INC-CD	RemoveCoupons (UserId,CouponId (ID:int))	Incentive.Coupons
O-INC-CU	UpdateCoupons (UserId, CouponDesc)	Incentive.Coupons
O-INC-CN	CreateCoupons (UserId, CouponDesc)	Incentive.Coupons
O-INC-CA	SetCouponActivation (UserId, CouponId (ID:int), activated: True/false)	Incentive.Coupons
O-INC-CV	EmitVoucher (UserId, CouponId)	Incentive.Coupons

Table 60 – Incentives – Management of coupons - Interaction with the MoveUs Platform Services

4.2.8 Management of Advertisement items

4.2.8.1 Description

Users of type UT6s can insert, edit and delete advertisement items by specifying:

I. A title, subtitle, long and short description.
II. The URLs of the details page and a descriptive image.
III. The geographical and temporal validity
IV. The applicable interests that allow the advertisement to be filtered according to the users' interests specified by them during the registration phase.

An advertisement is showed to the user according to the following policies:

- The user must have agreed to receive ads items.
- The time, geographic and interest parameters are applied
- The advertisement is displayed with a frequency regulated by specific settings under the control of the administrator.

4.2.8.2 Elements and operations

The elements and operations definitions for this functionality are similar to those specified for the management of rules (sect. 4.2.3) because, exactly like for the above case the following features are present:

- a list of items is shown with edit and delete buttons
- an edit form is present to insert and modify the items
- restrictions for delete and edit operations have to be applied following the notes specified in the description of this function above
- the logout facility is present

In this case a feature (button) for switching from the incentive edit and currency edit functions must also be applied.

4.2.8.3 Interaction with the MoveUs Platform Services

Incentives- Advertisement Management	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 18/09/2014*

Operation ID	**MoveUs Service**	**Data Model Package**
O-INC-ADL	RequestAdvertisementItem (UserId): [Advertisement]*	Incentive.Advertisement
O-INC-ADD	RemoveAdvertisementItem (UserId,AdvertisementId (title:string))	Incentive.Advertisement
O-INC-ADU	UpdateAdvertisementItem (UserId, AdvertisementDesc)	Incentive.Advertisement
O-INC-ANN	CreateAdvertisementItem (UserId)	Incentive.Advertisement
O-INC-ANNF	NotifyAdvertisementData (UserId, AdvertisementInfo)	Incentive.Advertisement

Table 61 – Incentives – Management of advertisement items - Interaction with the MoveUs Platform Services

4.2.9 Access to information on available Incentives, Rules, Awards & Coupons.

4.2.9.1 Description

This web tool is **linked to the end user mobile app**[13] by means of a dedicated menu item. With this tool the user of type 4 can issue a request of information on the following items:

- Incentives and associated rules
- Awards,
- Coupons,

These requests are managed by the web tool that retrieves the information from the MoveUs DB and displays it to the end user.

During the visualization, the end user has the possibility of requesting an award or a coupon.

[13] The mobile app will have a link to open the web tool (web page)

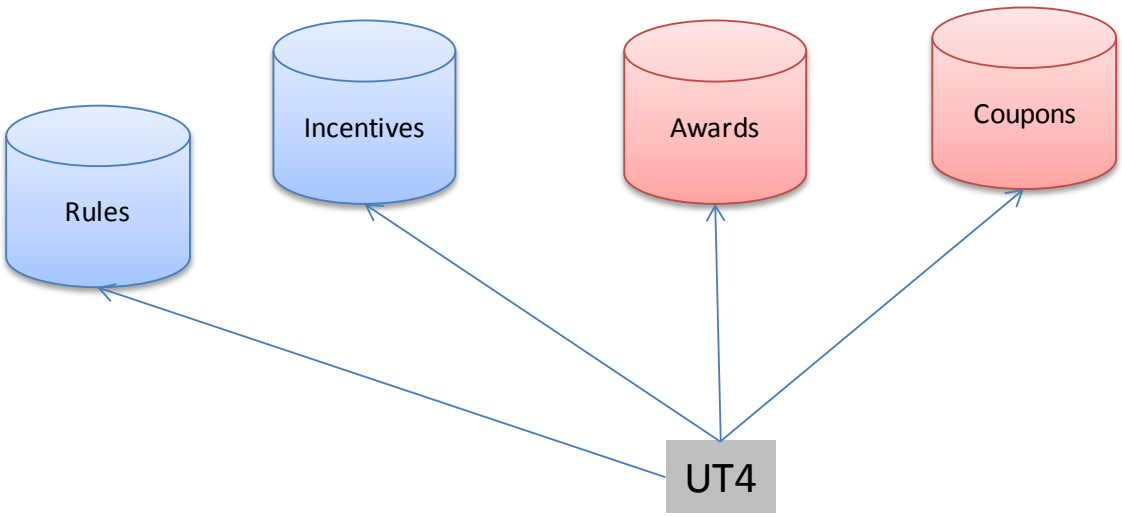

Figure 5 – Access to information and request of coupons or awards

4.2.9.2 Elements and operations

The elements and operations definitions for this functionality can be derived directly from those specified for the management of rules (sect. 4.2.3) because, like for the above case the following features are present:

- a list of items is shown
- a "view" button is present to view the details of the items
- the details are shown in a panel

In this case no edit operation is present.

Instead, a 'get award' or 'get coupon' button has to be added when the details of the respective item are shown. This will open the tool for requesting an award (4.2.10) or a coupon (4.2.11).

4.2.9.3 Interaction with the MoveUs Platform Services

Incentives- Incentive Information Access	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 18/09/2014*
Operation ID	**MoveUs Service**	**Data Model Package**
O-INC-QIL	RequestIncentiveList (UserId): [MV_Incentive]*	Incentive.Incentive
O-INC-AAL	RequestAwardList (UserId): [MV_Awards]*	Incentive.Awards
O-INC-QCL	RequestCouponList (UserId, Award): [CouponDesc]*	Incentive.Coupons

Table 62 – Incentives – Access to information - Interaction with the MoveUs Platform Services

4.2.10 Request of Awards

4.2.10.1 Description

With this web tool, the user of type 4 can select an award from the catalogue displayed with the tool in 4.2.9. The following operations are executed:

I. The details of the requested award are retrieved from the DB. This includes the requested amount of incentives and the trade-off between the requested amount of incentives and the amount of real money to pay. The last information is retrieved from the applicable incentive payment type.
II. Based on the amount of incentives that the user chooses to pay, the user balance is read to check if this amount is actually present.
III. A confirmation is asked about the actual willingness of receiving the award
IV. Following the confirmation:
    a. The user balance is updated.
    b. The amount of awards is updated in the awards DB.
    c. The user of type 3 that provided the selected award is notified about the assignment of the award to the user.
    d. A request of issuing a voucher is sent to the voucher management module.
    e. The voucher management module creates the voucher with all necessary data and assigns the voucher to the user. The MoveUs DB (vouchers) is updated accordingly.
    f. The voucher is shown to the user.
    g. The UT3 is notified about the new issued Voucher.
V. Both users of type 3 and 4 can retrieve the details on the issued voucher of pertinence by using the voucher retrieval tool (see 4.2.12).

4.2.10.2 Elements

Incentives – Request of Awards	*ELEMENTS*	*Last revision: 29/09/2014*				
ID	**Name**	**Type**	**Description**	**G**	**M**	**T**
E-INC-AWD	Award details	Text fields and buttons	Panel for showing the details of the award and confirming the willingness of getting it.	X		
E-INC-AWP	Selection of payment type	Text fields and buttons	Form for selecting the type of payment and amount of incentives vs. real money	X		
E-INC-AWV	Voucher display	Text fields and buttons	Panel for displaying the voucher and print it or send it by email	X		
E-INC-LO	Logoff	Button	Button for logging off	X		

Table 63 – Incentives – Request of awards - Elements

4.2.10.3 Operations

Incentives – Request of Awards	*OPERATIONS*	*Last revision: 29/09/2014*				
ID	**Operation**	**Description**	**Ref. Element**	**G**	**M**	**T**
O-INC-AWD	Award display	The details on the requested award (from 4.2.9) are retrieved and shown. The user authentication is requested to execute this step.	E-INC-AWD	X		
O-INC-AWR	Award request	The user can request the award by pressing the appropriate button	E-INC-AWD	X		
O-INC-AWP	Selection of payment type	After confirmation, the user selects the type of payment and amount of incentives vs. real money to pay	E-INC-AWP	X		
O-INC-AWC	Commitment of award delivery	• The user balance is updated. • The amount of awards is updated in the awards DB. • The user of type 3 that provided the selected award is notified about the assignment of the award to the user. • A request of issuing a voucher is sent to the voucher management module. • The voucher management module creates the voucher with all necessary data and assigns the voucher to the user. The MoveUs DB (vouchers) is updated accordingly. • The UT3 is notified about the new issued voucher		X		
O-INC-AWV	Voucher display	The voucher is shown to the user. The user can select the “print” or “send by email” commands to print the voucher or send it to her/his email address.	E-INC-AWV	X		

Table 64 – Incentives – Request of awards - Operations

4.2.10.4 Interaction with the MoveUs Platform Services

Incentives- Request of Awards	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 18/09/2014*

Operation ID	**MoveUs Service**	**Data Model Package**
O-INC-AWD	RequestAwardLIst(): [AwardDesc]*	Incentives.Awards
O-INC-AWR	RequestAward (UserId,AwardsId): ACK/NACK	Incentives.Awards
O-INC-AWC, O-INC-AWV	NotifyRequestAward (UserId,AcquirerUserId, AwardsId): ACK/NACK EmitVoucher (UserId, CouponId) NotifyVoucherIssue (UserId,AcquirerUserId, AwardsId): ACK/NACK	Incentives.Awards Incentive.Voucher

Table 65 – Incentives – Request of Awards - Interaction with the MoveUs Platform Services

4.2.11 Request of Coupons

4.2.11.1 Description

With this web tool, the User of type UT4 selects a coupon from the catalogue available in 4.2.9. The following operations are executed:

I. The details on the requested Coupon are retrieved from the MoveUs DB
II. A confirmation is asked about the actual willingness of receiving the coupon
III. Following the confirmation:
   a. The amount of coupons is updated in the MoveUs DB.
   b. The UT5 that provided the coupon is notified about the assignment of the coupon to the user.
   c. If applicable[14], a request of issuing a voucher is sent to the voucher management module.
   d. The voucher management module creates the voucher with all necessary data and assigns the voucher to the user. The MoveUs DB (vouchers) is updated accordingly.
   e. The voucher is shown to the user.
   f. The UT5 is notified about the newly issued voucher.
VI. The users of type 4 and 5 can access the database to check the details on the issued vouchers of pertinence by using the voucher retrieval tool (see 4.2.12).

[14] The coupon and the associated voucher can be either requested directly to the organization providing the coupons or by using the MoveUs services (for example if the external organization has no voucher emission system).

4.2.11.2 Elements

Incentives – Request of Coupons	*ELEMENTS*	*Last revision: 29/09/2014*

ID	Name	Type	Description	G	M	T
E-INC-CPD	Coupons details	Text fields and buttons	Panel for showing the details of the coupon and confirming the willingness of getting it.	X		
E-INC-CPV	Voucher display	Text fields and buttons	Panel for displaying the voucher and print it or send it by email	X		
E-INC-LO	Logoff	Button	Button for logging off	X		

Table 66 – Incentives – Request of awards - Elements

4.2.11.3 Operations

Incentives – Request of Awards	*OPERATIONS*	*Last revision: 29/09/2014*

ID	Operation	Description	Ref. Element	G	M	T
O-INC-CPD	Coupon display	The details on the requested coupon are retrieved and shown. The user authentication is requested to execute this step.	E-INC-CPD	X		
O-INC-CPR	Coupon request	The user can request the coupon by pressing the appropriate button	E-INC-CPD	X		
O-INC-CPC	Commitment of coupon delivery	• The amount of coupons is updated in the coupons DB. • The user of type 5 that provided the selected coupon is notified about the assignment of the coupon to the user. • A request of issuing a voucher is sent to the voucher management module. • The voucher management module creates the voucher with all necessary data and assigns the voucher to the user. The MoveUs DB (vouchers) is updated accordingly.		X		

		• The UT3 is notified about the new issued voucher				
O-INC-CPV	Voucher display	The voucher is shown to the user. The user can select the "print" or "send by email" commands to print the voucher or send it to her/his email address.	E-INC-CPV	X		

Table 67 – Incentives – Request of awards - Operations

4.2.11.4 Interaction with the MoveUs Platform Services

Incentives- Request of Coupons	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 18/09/2014*

Operation ID	**MoveUs Service**	**Data Model Package**
O-INC-CPD O-INC-CPR	RequestCouponDeal (UserId,CouponId): ACK/NACK	Incentives.Coupons
O-INC-CPC O-INC-CPV	NotifyRequestCoupon (UserId,AcquirerUserId, CouponId): ACK/NACK EmitVoucher (UserId, CouponId) NotifyVoucherIssue (UserId,AcquirerUserId, AwardsId): ACK/NACK	Incentives.Coupons Incentive.Voucher

Table 68 – Incentives – Request of Coupons - Interaction with the MoveUs Platform Services

4.2.12 Voucher retrieval

4.2.12.1 Description

The voucher retrieval tool is used to retrieve the details on issued vouchers and can be seen as a read-only access tool from the vouchers DB.
The user types who can get the details on vouchers are:

- UT3 (can get the vouchers on awards provided by them and requested by all users of type 4)
- UT4 (can get the vouchers on the coupons and awards that the user has requested)
- UT5 (can get the vouchers on coupons provided by them and requested by all users of type 4)

After authentication the user automatically gets access to the list of vouchers of pertinence according to the above criteria.
By selecting an item the details are shown and can be printed.

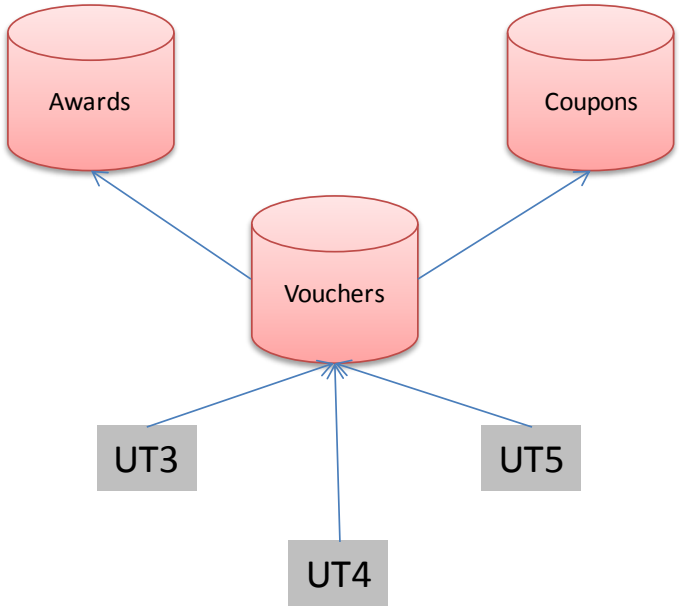

Figure 6 – Assignment of coupons and awards. Voucher issuing and access

4.2.12.2 Elements and operations

The elements and operations definitions for this functionality are similar to those specified for the management of rules (sect. 4.2.3) because, like for the above case the following features are present:

- a list of items is shown
- a "view" button is present to view the details of the items
- the details are shown in a panel

Additionally, the following buttons shall be added to the panel for the detailed visualization:

- *Print* (print the currently shown voucher)
- *Send by email* (the email address of the user[15] is retrieved and the voucher details are sent by email to the end user)

4.2.12.3 Interaction with the MoveUs Platform Services

Incentives- Incentive Information Access. Voucher	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 18/09/2014*
Operation ID	**MoveUs Service**	**Data Model Package**
O-INC-QVR	VoucherRetrieval (UserId)	Incentives.Voucher

[15] In order to use this function, the email address has to be considered as mandatory in the registration phase.

O-INC-QVL	RequestAVoucher (UserId, VoucherId, eMail: boolean)	Incentives.Voucher

Table 69 – Incentives – Voucher retrieval - Interaction with the MoveUs Platform Services

4.2.13 Administration module

The administration module is a web tool that allows a user with administrative privileges to perform configuration operations on:

- Advertisement publication
- Coupons publication
- Users

Advertisements-related settings

The advertisement should be displayed on the user's mobile app upon the following conditions:

I. Willingness of the user to get advertisements
II. Interests of the user
III. Geographical criteria (localized advertisements)

By using the administration tools the parameters II and III can be activated/deactivated by the administrator. Additionally, by using the tool the frequency of publication in the app of a single advertisement item can be controlled.

Coupon-related control

Each single coupon can be also activated or deactivated by the administrator.

User Management

Another option the administrator has is the activation/deactivation of single users as well as the capability of edit/delete each single element of the entire incentive-related domains (incentives, rules, advertisement items, coupons, awards)

4.2.13.1 Elements and operations

The elements and operations of the administration tool are web forms with checkbox, input fields and other controls that give the possibility of modifying the parameters described before.

Once logged in, the administrator has the possibility to modifying the values and confirming the changes.

4.2.13.2 Interaction with the MoveUs Platform Services

Incentives- Incentive Administration	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 18/09/2014*

Operation ID	**MoveUs Service**	**Data Model Package**
O-INC-ADAC	SetAdvertisementCondition ([Interest of user||Geographical criteria], TRUE/FALSE)	User Management (User Account.GeneralUserPreferences)
O-INC-ADAU	SetUserAdvertisement (UserId, true/false)	User Management (User Account.GeneralUserPreferences)
O-INC-ADC	UpdateCoupons (UserId, CouponDesc)	Incentive.Coupons

Table 70 – Incentives – administration module - Interaction with the MoveUs Platform Services

4.2.14 Summary of functions and roles

The following table resumes the functions available with the incentive-related web tools and the user types to which the access is granted with user name and password. In the specific case of UT4, vouchers retrieval will be granted with user name, password and email address.

Incentive Web Tool	**Accessibility (with user and password)**						
	UT1	UT2	UT3	UT4	UT5	UT6	Admin
User Registration.	public	public	public	n.a.	public	public	n.a.
Management of Rules	X						X
Management of Incentives		X					X
Management of Incentive Payment Types			X				X
Management of Awards			X				X
Management of Coupons					X		X
Management of Advertisement items						X	X
Access to information.	X	X	X	X	X	X	X
Request of Awards				X			X
Request of Coupons				X			X
Voucher Retrieval			X	X			X
Administration tools							X

Table 71 – Incentives – Resume of functions and roles

5 Services for Genoa

5.1 Integration of crowd sourced data – administration tool

The Feedback Console is the main window for viewing and managing feedback, only accessible and usable by operators (registered users). The window displays information about feedback in a table and in a map format, and it is possible to use menu options and several toolbars to view detailed information and take action on feedbacks provided by users. The final application will manage two distinct kind of feedback:

- Feedback to evaluate the data-set provided by the "Personal Multi-modal journey planner";
- Provision of new data on traffic in order to integrate the Traffic Supervisor Alarm/Events repository. In this case the process of validation could be automatic, semi-automatic or performed by an operator.

Feedback Console lists information about feedback received. By default, a certain set of columns (parameters) is displayed. It is possible to change the columns/parameters displayed, by using the 'View' pulldown menu.

The Feedback Console will be fully integrated in the infomobility platform, and it will also be opened to the relative stakeholders.

5.1.1.1 Elements

Integration of CSD		*ELEMENTS*	*Last revision: 5/09/2014*
ID	**Name**	**Type**	**Description**
E-CDG-CS-LOG-LF	Basic login form	Form	Form elements that allow the users to login in the Console with their username and a password.
E-CDG-CS-LOG--RE	Account recovery form	Link	Form for recovering a lost username or password. It allows inserting the email address indicated in the registration phase.
E-CDG-CS-MM	Main menu	Menu	Main menu is the window for viewing and managing feedback
E-CDG-CS-EVA-1	Accept feedback	Button	Accepts the selected feedback and integrates it into the existing Traffic Supervisor repository

E-CDG-CS-EVA-2	Reject feedback	Button	Removes the feedback from the system. The feedback is discarded and is removed from the Feedback Console table. The alarm is also deleted from the Feedback database, but a copy is retained for historical purpose.
E-CDG-CS-HLP-1	Help	Button	Opens the online help for the Feedback Console
E-CDG-CS-INF-1	Feedback details	Button	Opens the details view to obtain additional information about the feedback and manage the feedback.
E-CDG-CS-INF-2	Feedback filter	Button	Opens the filter dialog where is possible to enter text in order to display only feedback that contains that text.
E-CDG-CS-INF-3	Find feedback	Button	Opens the find dialog
E-CDG-CS-FND-FBK	Find feedback dialog	Dialog	This dialog allows searching for a particular feedback according to a particular specified text.
E-CDG-CS-EDT-FBK	Edit feedback dialog	Dialog	This dialog allows to edit a particular feedback
E-CDG-CS-INF-4	Cluster feedback	Button	Displays similar feedback according to the parameters set such as time interval, geographical area, kind, etc…
E-CDG-CS-INF-5	Select all feedback	Button	Selects all feedback in the Feedback Console table.
E-CDG-CS-INF-6	Deselect all feedback	Button	Deselects all feedback in the Feedback Console table.
E-CDG-CS-CMD-1	Export feedback	Button	Opens the export dialog to export feedback in different formats
E-CDG-CS-MAP-1	Map menu	Button	Display all the feedback received in a map
E-CDG-CS-MAP-2	Map type control options	Button	Switches between the following map types: • ROADMAP – Displays normal street/road map (default map type). • TERRAIN – Displays normal street/road map based on terrain information. • SATELLITE – Displays satellite images only. • HYBRID – Mixed normal and satellite views, displays street/road views on

			top of the satellite images.
E-CDG-CS-MAP-3	Map search box	Text field	Opens a search box with auto-complete functionality. User can enter geographical searches.
E-CDG-CS-SYS-1	On/Off-line mode	Button	Stops updates and put off-line the Feedback Console. Otherwise, the feedbacks are received dynamically.
E-CDG-CS-SYS-2	View log	Button	Opens the log dialog (a text file) to view information about each transaction for the feedbacks.
E-CDG-CS-SYS-3	View Feedback Console preferences	Button	Opens the Preferences dialog to choose settings for the Feedback Console.
E-CDG-CS-PRE	Feedback Console preferences	Menu	Several parameters are available for the Feedback Console such as • Clustering Options • Log level detail Process of validation mode (automatic, semi-automatic or performed by an operator)

Table 72 – Integration of crowded sourced data - Elements

5.1.1.2 Operations

Integration of CSD	*OPERATIONS*	*Last revision: 22/09/2014*	
ID	**Operation**	**Description**	**Ref. Element**
O-CDG-CS-BL	Preliminary login	The login Form opens. The user indicates: username, password	E-CDG-CS-LOG-LF
O-CDG-CS-BL-VUC	Verification of user credentials.	The MoveUs platform is invoked to check if the user credentials are correct. If no error occurs, the execution flow goes to operation O-CDG-CS-MM-VIS.	E-CDG-CS-LOG-LF
O-LOG-AR	Access to account recovery	The user selects the command/link that open the form for recovering a lost username or password.	E-CDG-CS-LOG-LF
O-LOG-RE	User name and password recovery	The user indicates his email address to perform the request of username and password recovery. An email is sent by the MoveUs platform to the email address	E-CDG-CS-LOG-RE

		indicated with the necessary information.	
O-CDG-CS-MM-VIS	Visualization of the main menu	The menu items are displayed according to the parameters set.	E-CDG-CS-MM
O-CDG-CS-MM-SEL	Selection from the main menu	The selection of an item of the main menu executes the related functionality.	E-CDG-CS-SYS-1; E-CDG-CS-SYS-2; E-CDG-CS-SYS-3; E-CDG-CS-MAP-1
O-CDG-CS-MAP-VIS	Visualization of the map menu	The map menu is displayed according to the parameters set.	E-CDG-CS-MM
O-CDG-CS-MM-SEL	Selection from the map menu	The selection of an item of the main menu executes the related functionality.	E-CDG-CS-MAP-2; E-CDG-CS-MAP-3
O-CDG-CS-HLP-VIS	Visualization of the help menu	The help menu is displayed	E-CDG-CS-HLP-1
O-CDG-CS-FND-FBK	Textual indication to find feedback	The user can type a text into the elements E-CDG-CS-FND-FBK (Find feedback)	E-CDG-CS-FND-FBK
O-CDG-CS-EDT-FBK	Textual indication for edit feedback	The user can modify the feedback using E-CDG-CS-EDT-FBK (Edit feedback)	E-CDG-CS-EDT-FBK
O-CDG-CS-CS-SYS3-E	Editing of Feedback Console preferences	The user can modify the setting of the Feedback Console.	E-CDG-CS-PRE

Table 73 – Integration of crowded sourced data - Operations

5.1.1.3 Interaction with the MoveUs Platform Services

Integration of CSD	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 22/09/2014*

Operation ID	**MoveUs Service**	**Data Model Package**
O-CDG-CS-BL	Login (UserId, password)	IAM Credentials
O-LOG-AR	UserPersonalRecovery (UserId)	IAM Credentials
O-LOG-RE	UserPersonalRecovery (eMail)	IAM Credentials
O-CDG-CS-MM-	GetApplicationConfiguration (UserId, Location)	Registry

VIS/SEL		
O-CDG-CS-FND-FBK	RequestQualityFeedback (UserId)	Feedback
O-CDG-CS-EDT-FBK	UpdateQualityFeedback (UserId, feedback)	Feedback

Table 74 – Integration of crowded sourced data - Interaction with the MoveUs Platform Services

6 Madrid site-specific City Services

6.1 Priority request service for public buses – web application for public bus operator

The priority request is a service targeting urban public buses; therefore, the service is not conceived for anonymous users.

This service is supporting the use case 1 specified in Madrid city: UC1 Smart prioritization of vehicles.

A user account will be created in MoveUs for the public bus operator so as to enable it to use the priority request service, having the previous approval from the corresponding city council.

The priority request web application will be running both in the ESS of the public bus operator and in the OBU of the vehicles.

In section 6.1 the web application implemented in the ESS is described. In subsequent section 6.2 the web application implemented in the OBU will be described.

A smartphone linked to the OBU will be used on board to visually inform the driver about the priority service progress.

The application implemented in the ESS will enable the user to:

- Download the location and topology of the crossings with the priority functionality implemented.

- Upload into MoveUs platform the static information and updated information on the public bus service, and download any updating information related to the traffic infrastructure.

- Provide MoveUs platform with feedback about the overall service performance.

The following sub-functions are identified for this application:

- Main page management
- Information updating
- Feedback provision

6.1.1 Main Menu Page Management

6.1.1.1 Description

The main menu page shows a list of commands and/or icons through which the single main functions can be launched.

6.1.1.2 Elements

Main Menu Page Management	*ELEMENTS*		*Last revision: 28/07/2014*
ID	**Name**	**Type**	**Description**
E-PR-MM-M	Main menu page	List or grid of commands	List of commands that launches the main functionalities

Table 75 – Priority request service - Main menu - Elements

6.1.1.3 Operations

Main Menu Page Management	*OPERATIONS*		*Last revision: 13/06/2014*
ID	**Operation**	**Description**	**Ref. Element**
O-PR-MM-VIS	Visualization of the main menu page	The menu items are displayed in the main menu page	E-PR-MM-M
O-PR-MM-SEL	Selection from the main menu page	The selection of an item of the main menu executes the related functionality.	E-PR-MM-M

Table 76 – Priority request service - Main menu - Operations

6.1.1.4 Interaction with the MoveUs Platform Services

User Profile Creation	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 29/09/2014*
Operation ID	**MoveUs Service**	**Data Model Package**
O-PR-MM-VIS	GetApplicationConfiguration (UserId, location)	Registry

Table 77 – Priority Request service - Main menu - Interaction with the MoveUs Platform Services

6.1.2 Information updating

6.1.2.1 Description

This function enables the user to access and download, as well as to upload and update, the relevant information in MoveUs for the operation of the service.

6.1.2.2 Elements

Information updating	*ELEMENTS*	*Last revision: 28/07/2014*

ID	Name	Type	Description
E-PR-IU-TID	Static traffic information downloading link	Link	Link to click and download the pre-configured static traffic information from MoveUs about the traffic infrastructure of the city needed for the provision of the priority service. This link will be accessible in the main menu page (see E-PR-MM-M)
E-PR-IU-SIU	Public bus static information uploading link	Link	Link to click and upload into MoveUs the static information from the public bus system needed for the priority request service. The bus operator will use this link also to upload updated information. This link will be accessible in the main menu page (see E-PR-MM-M).
E-PR-IU-UINP	Updated information notification area	Text area and link	Text area that informs the user that new or updated information from the traffic infrastructure has been uploaded in MoveUs and link to download the new/updated information. This text area will refer the user to the downloading link (see E-PR-IU-GCI) so as to download the updated traffic information.

Table 78 – Priority Request service – Information updating - Elements

6.1.2.3 Operations

Information updating	*OPERATIONS*	*Last revision: 28/07/2014*

ID	Operation	Description	Ref. Element
O-PR-IU-TID	Static traffic information downloading	The user can click the link shown in the main menu Page in order to download the static traffic information; a text message informing about the availability of such information will be shown in the updated information notification page.	E-PR-IU-TID E-PR-IU-UINP
O-PR-IU-SIU	Uploading public bus static information	The user will upload the public bus static information into MoveUs by clicking the corresponding link.	E-PR-IU-SIU
O-PR-IU-UINP	Notification of updated information to be downloaded	Whenever MoveUs is updated with traffic information relevant for the provision of the priority service, a message will be shown in the	E-PR-IU-UINP

	from MoveUs	updated information notification area in the main menu, referring to the availability of updated information and the link to click in order to download it.	

Table 79 – Priority Request service – information updating - Elements

6.1.2.4 Interaction with the MoveUs Platform Services

Information updating	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 29/09/2014*

Operation ID	MoveUs Service	Data Model Package
O-PR-IU-TID	RequestRoadStaticInformation ()	Urban Road Static Data (RoadDataModel, TrafficRegulation.StaticModel.BT and J235)
O-PR-IU-SIU	SetPTStaticInformation ()	PT Static Data (PT ServiceModel, PT Line ManagementModel)
O-PR-IU-UINP	NotifyRoadStaticInformation()	Urban Road Static Data (RoadDataModel, TrafficRegulation.StaticModel.BT and J235)
O-PR-IU-UINP	NotifyRoadDynamicInformation()	Urban Road Dynamic Data (MeasuredDataPublication)

Table 80 – Priority Request service – Information updating – Interaction with the moveus platform services

6.1.3 Feedback Provision

6.1.3.1 Description

At the end of the bus service, the operators of the public bus will be able to report the overall feedback on the priority request for the different bus lines operating.

6.1.3.2 Elements

Feedback Provision	*ELEMENTS*	*Last revision: 08/08/2014*

ID	Name	Type	Description
E-TP-FB-PR-ext	Overall feedback panel (extended version of the E-TP-FB defined for	Panel with 1 to 5 stars indicators	Panel for the provision of the overall feedback on the priority request service

	the journey planning and mobility information)		

Table 81 – Priority Request service – Feedback Provision - Elements

6.1.3.3 Operations

Feedback Functions		*OPERATIONS*	*Last revision: 28/07/2014*
ID	**Operation**	**Description**	**Ref. Element**
O-TP-FB-PR	Overall feedback provision	By selecting a dedicated button on the main menu page the user opens the element E-TP-FB-PR-ext where an overall feedback on the service can be provided. The feedback is composed by a number of 1 to 5 stars quality indicators on: • Response Time • Quality of service • Reliability And a text area to provide with comments for improvement/ report further feedback.	E-TP-FB-PR-ext

Table 82 – Priority request service – Feedback provision - Operations

6.1.3.4 Interaction with the MoveUs Platform Services

Feedback Functions	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 29/09/2014*
Operation ID	**MoveUs Service**	**Data Model Package**
O-TP-FB-PR	SetQualityFeedback (UserId, QualityFeedback)	Feedback

Table 83 – Priority request service – Feedback provision – Interaction with the MoveUs platform services

6.2 Priority request service for public buses – web application for the public bus driver

The web application implemented in the OBU will enable:

- Sending an automatic priority request to MoveUs platform and inform about the location of buses in real time while the request is active: this action will be

triggered automatically by the OBU of the delayed bus through the application implemented.

- Receive notifications either from the ESS system or from MoveUs: the ESS system can suggest the OBU to launch a request for priority for the next crossing; In addition, MoveUs can notify the OBU that the priority request has been accepted or not by the traffic system.

The following sub-functions are identified for this application:

- Priority request and bus positioning

- Receiving push notifications

6.2.1 Priority Request

6.2.1.1 Description

This function allows a bus to make a request of priority to MoveUs in the upcoming crossing through the OBU. In the specific case of Madrid pilot, the bus will request priority only in case of delay in its route.

The delayed bus located at the detection zone, will send a priority request message to MoveUs platform, including complementary information like the bus identification code, the bus line, direction and delay, and the location of the bus at short time intervals so as to enable the traffic infrastructure (the LTC that will have to trigger the prioritization actions for the bus) through MoveUs to estimate the time it will take the bus to reach the traffic light stop line.

This function will be triggered automatically by the OBU to MoveUs platform. Therefore, the application to be implemented in the OBU will not have interfaces with the human (bus driver).

6.2.1.2 Elements

Priority Request		*ELEMENTS*	*Last revision: 28/07/2014*
ID	**Name**	**Type**	**Description**
E-PR-PR-PB	Priority request message	M2M message	This message will be sent to MoveUs by the OBU of the vehicle (bus) that requests priority in the next crossing. The application will send this message automatically once the bus has entered into a detection zone; the ESS system must have downloaded this pre-configured or updated information previously from MoveUs.

Table 84 – Priority request service – Priority request – Elements

6.2.1.3 Operations

Priority Request		*OPERATIONS*	*Last revision: 28/07/2014*
ID	**Operation**	**Description**	**Ref. Element**
O-PR-PR-PR	Launch of a priority request	The application sends the priority request message through the OBU for the upcoming crossing. The OBU will have been previously advised to request priority by the ESS system.	E-PR-PR-PB
O-PR-PR-GPS	Sending the position of the bus at a periodic basis	The bus will be sending its position to MoveUs at time intervals after having requested priority, until it receives back the notification that the request has been accepted or not (see the next function "Receiving Push Notifications")	E-PR-RN-NM (see the next function "Receiving Push Notifications")

Table 85 – Priority Request service – Priority Request – Operations

6.2.1.4 Interaction with the MoveUs Platform Services

Priority Request	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 29/09/2014*
Operation ID	**MoveUs Service**	**Data Model Package**
O-FR-PR-PR	SendPriorityRequest (USerId)(OBU))	Public Transport Service. (PT.Journey.VehicleJourneyInfo) Urban Road Static Data (RoadDataModel, TrafficRegulation.StaticModel.BT and J235)
O-FR-PR-GPS	SendPTPosition (USerId (OBU) ,position)	Public Transport Service (PT.Journey.VehicleJourneyInfo)

Table 86 – Priority Request service – Priority Request – Interaction with the MoveUs Platform

6.2.2 Receiving Push Notifications

6.2.2.1 Description

This function allows the bus driver to receive notifications sent either by the ESS system or by MoveUs system.

Two types of notifications are envisaged to be received in the OBU:

- Advice to request priority in the next crossing: this notification will be triggered by the ESS system when it detects that the bus is delayed in its route.

- Acceptance or not of request for priority to the bus driver: this notification will be sent from MoveUs system, only if MoveUs receives from the LTC a message accepting the request for priority.

6.2.2.2 Elements

Receiving Push Notifications	*ELEMENTS*		*Last revision: 28/07/2014*
ID	**Name**	**Type**	**Description**
E-PR-RN-NM	Notification message	M2M message	Message with information related to the priority request action.

Table 87 – Priority Request service – Receiving Push notifications – Elements

6.2.2.3 Operations

Receiving Push Notifications	*OPERATIONS*		*Last revision: 28/07/2014*
ID	**Operation**	**Description**	**Ref. Element**
O-PR-RN-NN	Notifications on the priority request action	The OBU receives notifications from the ESS to request priority for the next crossing, or from MoveUs platform about the acceptance or not of the priority request.	E-PR-RN-NM

Table 88 – Priority Request service – Receiving Push notifications – Operations

6.2.2.4 Interaction with the MoveUs Platform Services

(Receiving Push Notifications)	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 29/09/2014*
Operation ID	**MoveUs Service**	**Data Model Package**
O-PR-RN-NN	NotifyPriorityRequestAcceptance ()	Notification Request Data

Table 89 – Priority Request service – Receiving Push notifications – Interaction with the MoveUs Platform

It is to note the HMI of this service will be implemented in a smartphone connected to the OBU, and will be used to inform the driver about the bus positioning and progress of the priority service. Therefore, the following elements and operations sections are related only to the HMI of the smartphone. No interactions with MoveUs platform are envisaged, then.

6.2.2.5 Elements

Visualization of positioning and information	*ELEMENTS*	*Last revision: 28/07/2014*	
ID	**Name**	**Type**	**Description**
E-PR-VI	Bus positioning and priority service status and progress	Map and text	The map will show the position of the bus in its route and will textually inform the driver about the service: - delay/advance of the bus service - priority requested for the next intersection - acceptance or not of the priority for the bus in the next intersection.

Table 90 – Priority request service – Visualization of positioning and information - Elements

6.2.2.6 Operations

Priority Request	*OPERATIONS*	*Last revision: 28/07/2014*	
ID	**Operation**	**Description**	**Ref. Element**
O-PR-VI-VIS	Visualization of bus positioning and priority request service	The bus driver will be able to see the bus position in the map and to know the status and progress of the priority service.	E-PR-VI

Table 91 – Priority request service – Visualization of positioning and information - Operations

6.3 Smart Crossing – mobile application

The Smart crossing is a service available to be used by pedestrians. This service supports one of the specific use cases for the city of Madrid: UC2b - Smart Crossing for pedestrian.

The smart crossing mobile application allows the user to get the smartest crossing options for a predefined route, whether using special crossing points or by applying a reaffirmation of a demand in those points with bluetooth technology locally implemented.

The application runs in the users' personal device (smart phone) and is accessible to users registered in MoveUs that will be able to download it from the main menu screen of the common MoveUs application.

This service also supports the user to cross safely at those smart crossings implemented with a camera to detect pedestrian crossing (called SafeCross) and that is able to extend green phase if needed. In those cases the MoveUs platform and the personal device app are informed of the crossing process but it is the LTC implemented with the SafeCross system which really manages the crossing rules.

There is a continuous information flow between MoveUs and all the systems and actors involved, so that MoveUs will have all the information and actions collected.

Previous steps need to be taken in the common MoveUs app so as to use this application:

- User registration
- Login and authentication
- Smart crossing app downloading

Those functions are described in section 5.1 *Mobile App for Journey Planning and mobility information* of this document.

For the Smart crossing specific service there are a series of functions identified:

- Smart crossing main menu screen
- Receiving push notifications
- Smart crossing request

Below in this section a reference to those functions needed for the service that will be provided by the *Mobile App for Journey Planning and mobility information* is included; Furthermore, the smart crossing functions specific for the service that will not be provided by the aforementioned app will be specified.

6.3.1 User Registration

This function is included in the specification of the common service: journey planning and mobility information (see section 5.1.2 User Registration); this function will be available for anonymous users.

6.3.2 Login and authentication

This function is included in the specification of the common service: journey planning and mobility information (see section 5.1.3 Login)

6.3.3 Smart Crossing App. downloading

A specific application is used to obtain the information and benefits that this smart crossing offers as a service. The user either anonymous or registered will have access to the main menu page where he will be able to download the smart crossing app by clicking in the correspondent link.

The element and operations that enables the downloading of the smart crossing application has already been specified in common service: journey planning and mobility information (see section 4.1.1 Main screen menu)

The specific element is identified as E-MM-M-ext. The two specific operations are identified as O-MM-VIS-ext and O-MM-SEL-ext.

6.3.4 Main Menu Screen

6.3.4.1 Description

The main screen menu is a list of commands, buttons or icons through which the single main functions can be launched. The functions accessible through the main menu are the following:

- Route request

- Get information on smart crossings

- Smart crossing starting (this function is composed of different sub-functions)

- Feedback function

In the case of the functions route request and feedback, the smart crossing application will direct the user to the common service journey planning and mobility information (see sections 5.1.4 Trip Planning, and 5.1.3 Feedback function).

6.3.4.2 Anonymous access

The implementation of an anonymous access for this group of functionalities is only partially possible.

An anonymous user will be able to visualize the main menu through O-SC-MM-VIS; however, the selection and launching of functionalities from the main menu will only partially grantedfor anonymous users, as specified in the following sections.

6.3.4.1 Elements

Main Menu Management		ELEMENTS	Last revision: 07/08/2014
ID	**Name**	**Type**	**Description**
E-SC-MM-M	Main menu	List or grid of button or commands	List of commands that launch the main functionalities

Table 92 – Smart crossing – Main menu management - Elements

NOTE: SC stands for Smart Crossing

6.3.4.2 Operations

Main Menu Management		OPERATIONS	Last revision: 07/08/2014
ID	**Operation**	**Description**	**Ref. Element**
O-SC-MM-VIS	Visualization of the main menu	The menu items are displayed according to the entries of the internal registry	E-SC-MM-M
O-SC-MM-SEL	Selection from the main menu	The selection of an item of the main menu executes the related functionality.	E-SC-MM-M

Table 93 – Smart crossing – Main menu management - Operations

6.3.4.3 Interaction with the MoveUs Platform Services

Main Menu Management	INTERACTION WITH MoveUs PLATFORM	Last revision: 07/08/2014
Operation ID	**MoveUs Service**	**Data Model Package**
O-SC-MM-VIS	GetApplicationConfiguration (UserId, location)	Registry

Table 94 – Smart Crossing – Main menu management – Interaction with the MoveUs platform

6.3.5 Routing Request

6.3.5.1 Description

The main menu screen will show a button that can be clicked and the user either anonymous or registered will be automatically directed to the journey planning and

mobility information service from the common app so as to obtain the route on foot.

6.3.5.2 Elements

All elements from the trip planning function applicable to Madrid pilot will apply in this function, except those related specifically to the trip by car: E-TP-TICAR, E-TP-TR, E-TP-TIW and E-TP-UTS.

6.3.5.3 Operations

All operations from the trip planning function applicable to Madrid pilot will apply in this function, except those related specifically to the trip by car: O-TP-STU, O-TP-CAR, O-TP-TEXTCAR, O-TP-TRAF and O-TP-WARN.

6.3.5.4 Interaction with the MoveUs Platform Services

The same as in the get information function of the journey planning and mobility information service (see section 4.1.6).

6.3.6 Get Information on Smart crossings

6.3.6.1 Description

The main menu screen will show a button that can be clicked by the user either anonymous or registered so as to learn where the smart crossings are located, and if they are implemented with the SafeCross system.

Such button will direct the user to the get information function described for the journey planning and mobility information service from the common app, considering only the walking option.

6.3.6.2 Elements

The elements from the get information function specified for the journey planning and mobility information service applicable for Madrid will apply here.

6.3.6.3 Operations

The operations from the get information function specified for the journey planning and mobility information service applicable for Madrid will apply here.

6.3.6.4 Interaction with the MoveUs Platform Services

The same as in the get information function of the journey planning and mobility information service. (see section 4.1.6).

6.3.7 Push Notification

This function enables the user to download the new and updated information from MoveUs for the operation of this service.

This functionality will be enabled for registered users only.

6.3.7.1 Elements

Push Notification		*ELEMENTS*	*Last revision: 07/08/2014*
ID	**Name**	**Type**	**Description**
E-SC-PN-UINP	Updated information notification page	Text area and link	Page that pop ups automatically and informs the user that new or updated information has been uploaded in MoveUs and link to download the new/updated information.

Table 95 – Smart crossing – Push notification - Elements

6.3.7.2 Operations

Push Notification		*OPERATIONS*	*Last revision: 07/08/2014*
ID	**Operation**	**Description**	**Ref. Element**
O-SC-PN-NUI	Notification of updated information to be downloaded from MoveUs	Whenever MoveUs is updated with relevant information for the provision of this service, the updated information notification page will automatically pop up in the smart crossing informing the user that updated information can be downloaded from MoveUs.	E-SC-PN-UINP
O-SC-PN-ID	Information downloading	The user can download the information by clicking the button on the notification page	E-SC-IU-SCID

Table 96 – Smart crossing – Push notification - Operations

6.3.7.3 Interaction with the MoveUs Platform Services

Push Notification	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 07/08/2014*

Operation ID	MoveUs Service	Data Model Package
O-SC-PN-NUI	NotifyPoIChanges (PoI.Id) // NotifyPoIChanges (Crosses)	EmotionFeature.PointOfInterest
O-SC-PN-ID	RequestPoIStaticInformation (PoI.Id)	EmotionFeature.PointOfInterest
O-SC-PN-ID	RequestPoIDynamicInformation (PoI.Id)	EmotionFeature.PointOfInterest

Table 97 – Smart crossing – Push notification – Interaction with the MoveUs Platform services

6.3.8 Smart Crossing Request

6.3.8.1 Description

For the use of this service it is necessary to enable tracking the personal device at timely basis (every 1 minute, 5 minutes, etc.). Therefore, both the personal device bluetooth and GPS must be activated, although the bluetooth can be kept mute for battery saving until the user has entered into a detection area.

The activation and deactivation of GPS and BT will be enabled from the main menu screen of the smart crossing application.

Once the user is detected in the nearby of the smart crossing, the bluetooth of the smartphone will unmute and the user will be positioned in the smart crossing by the system; afterwards, the smart crossing application will show the possible crossings and will ask the user to confirm where he is headed to.

The application will allow the user to mute the bluetooth back again once he has crossed, and to close the application at any time by clicking a button.

This functionality will be enabled for registered users only.

6.3.8.2 Elements

Smart Crossing Request	ELEMENTS		Last revision: 07/08/2014
ID	**Name**	**Type**	**Description**
E-SC-SC-GPSB	GPS activation button	Button	By clicking this button the user will be able to activate or deactivate the GPS of the smartphone.
E-SC-SC-BTB	Bluetooth activation button	Button	By clicking this button the user will be able to activate or deactivate the BT of the smartphone. The BT can be kept mute until it is automatically unmuted at the smart

			crossing by the application.
E-TP-IM_ext	Smart crossing confirmation panel	Graphic area buttons/ icons	An interactive map will show the possible crossings of the intersection to the user and buttons/icons on each of them for the user to click and confirm crossing request. This interactive map will be based on the interactive map specified for the journey planning and mobility information service)

Table 98 – Smart crossing – smart crossing request - Elements

6.3.8.3 Operations

Bluetooth Connection and BTFix selection	OPERATIONS	Last revision: 07/08/2014

ID	Operation	Description	Ref. Element
O-SC-SC-GPSA	Activation/deactivation of GPS	The user clicks on the GPS activation button so as to activate or deactivate the GPS function in his smartphone	E-SC-SC-GPSB
O-SC-SC-BTA	Activation/deactivation of BT	The user clicks on the BT activation button so as to activate or deactivate the BT function in his smartphone	E-SC-SC-BTB
O-SC-SC-SCSEL	Selection of crossing	The user selects the crossing he is set out by selecting the possible options in an interactive map (interactive map specified for the journey planning and mobility information service).	E-TP-IM_ext

Table 99 – Smart crossing – Smart crossing request - Operations

6.3.8.4 Interaction with the MoveUs Platform Services

Bluetooth connection and BTFix selection	INTERACTION WITH MoveUs PLATFORM	Last revision: 07/08/2014

Operation ID	MoveUs Service	Data Model Package
O-SC-SC-SCSEL	SendSmartCrossingReqConfirmation ()	EmotionFeature.PointOfInterest

Table 100 – Smart crossing – Smart crossing request – Interaction with the MoveUs Platform Services

6.3.9 Feedback provision

6.3.9.1 Description

The main menu of the smart crossing application will show a button that the user can click so as to report overall feedback on the smart crossing service.

This feedback button will direct the user to the overall feedback panel (E-TP-FB) included in the trip planning function already specified for the journey planning and mobility information service. (see section 4.1.4 trip planning), so that the user can feedback the overall performance of the service.

This functionality will be enabled for registered users only.

6.3.9.2 Elements

Feedback Provision		ELEMENTS	Last revision: 08/08/2014
ID	**Name**	**Type**	**Description**
E-TP-FB-SC-ext	Overall feedback panel (extended version of the E-TP-FB defined for the journey planning and mobility information)	Panel with 1 to 5 stars indicators	Panel for the provision of the overall feedback on the smart crossing service

Table 101 – Smart crossing – Feedback provision - Elements

6.3.9.3 Operations

Feedback Functions		*OPERATIONS*	*Last revision: 28/07/2014*
ID	**Operation**	**Description**	**Ref. Element**
O-TP-FB-SC	Overall feedback provision	By selecting a dedicated button on the main menu page the user opens the element E-TP-FB-PR-ext where an overall feedback on the service can be provided. The feedback is composed by a number of 1 to 5 stars quality indicators on: • Response Time • Quality of service • Reliability And a text area to provide with	E-TP-FB-SC-ext

		comments for improvement/ report further feedback.	

Table 102 – Smart crossing – Feedback provision - Operations

6.3.9.4 Interaction with the MoveUs Platform Services

Feedback Functions	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 29/09/2014*

Operation ID	**MoveUs Service**	**Data Model Package**
O-TP-FB-SC	SetQualityFeedback (UserId, QualityFeedback)	Feedback

Table 103 – Smart crossing – Feedback functions – Interaction with the MoveUs Platform Services

The same as in the case of the Trip Planning for the common app.

7 Tampere site-specific City Services

7.1 Energy Consumption Status and Suggestions – web application for MoveUs users

The energy consumption status and suggestion (ECSS) service provides the information related with the energy consumption for registered and anonymous users. Users can access the energy consumption status and suggestions service by accessing through the main menu. MoveUs application will send to the app the name of the user, if it is a registered user, including their last trip information. For anonymous users, it will only provide the last trip selection in the opened session in order to show the single energy consumption and motivate the user to register in the system to track their performance and obtain more accurate energy calculations.

The main objectives of this service include:

- To motivate MoveUs app users for the improvement of their energy efficiency when choosing the mode of transportation by providing their current energy efficiency as well as historical data to compare with previous dates and know if there have been improvements or identify patterns.
- To give the possibility for users to have more accurate calculation of the energy efficiency by extending the user´s profile (e.g. gender, age), so more variables can be considered for the energy efficiency calculation.
- To provide a set of suggestions for improving the energy efficiency based on their profile, preferences and habits. The suggestion will allow the user to make long-term decisions to improve their performance.

The first menu that will be displayed in this service is the current performance for registered and anonymous users. For registered users, more detail information will be provided and for anonymous users, a link to register to MoveUs system for receiving more accurate information.

The main menu for registered users will provide more accurate energy efficiency information, historical data, possible incentives and energy tips to improve the performance. In the initial definition of this service it was considered to share the status of the energy efficiency of users in social media to motivate people by making some competitions with friends or letter people know if they have more friendly habits. Unfortunately, this functionality was discarded for the MoveUs implementation because not all technical elements and specifications are available. In addition, as popular social networks like Facebook store personal data outside Europe and therefore this goes against EU Data Protection to store personal data outside Europe, and is not recommended for MoveUs. In the future, the City of Tampere will implement this functionality for the energy service app as it is well accepted in Finland by users.

7.1.1.1 Elements

Integration of ECSS	*ELEMENTS*	*Last revision: 17/09/2014*

ID	Name	Type	Description
E-EC-AU-CEC	Anonymous user current energy consumption	Text area	This element will display the current energy consumption level of the last selected journey in MoveUs app during the current session if a journey has been selected.
E-EC-AU-R	Anonymous user registration form to the energy service	Form	It gives the user the possibility to register for getting more accurate calculation of their performance. After filling the registration information, it takes the user to a set of questions to extend their profile and make more detail calculations of their consumption and provide suggestions for improving their performance
E-EC-RU-MM	Registered User Main Menu	Menu	The main menu of the registered user provides the current consumption status and the access to more specific information. It includes the information related with the last selected journey which is provided by MoveUs app to ECSS service
E-EC-RU-CE	Registered user current energy consumption information status	Button	It gives access the current status of the user energy consumption. For each transportation modality it will show the performance and a reference to how green the user has been with the environment with their transportation decisions.
E-EC-RU-CE-CI	Registered user current energy consumption status information	Text	This element will display the current status of the energy consumption of the user
E-EC-RU-HEC	Registered user historical energy consumption	Button	The historical information for the user energy consumption will be available here to compare previous status and how it has improved over time.
E-EC-RU-HIEC-HC	Registered user historical energy consumption information	Text	This element shows the historical information of the energy consumption of the user for the selected period
E-EC-RU-HIEC-HC	Period of historical information	Button	This element gives the possibility to select the period of time that wants to be consulted.
E-EC-RU-In	Registered user incentives information	Button	A set of possible incentives in the energy efficiency app that can be accessed from this button. The energy module manages the

			incentives which a set of figures that represent prices for users. The original idea was to upload information in social media but this is a feature that will be implemented in the future for Tampere City (after MoveUs).
E-EC_RU_II	Incentives information status	Text	This element shows the prices related with energy efficiency (e.g. figures of medals in the energy app)
E-EC-RU-Tip	Registered user tips	Button	A set of tips for improving the energy efficiency can be accessed from this element, which will be selected based on the user preferences, habits, profile, etc.
E_EC_TU_TI	Tips information	Text	This element displays a list of suggestions for the user based on their profile and their performance in energy consumption

Table 104 – Integration of energy consumption status and suggestions - Elements

7.1.1.2 Operations

Integration of ECSS	*OPERATIONS*	*Last revision: 17/09/2014*	
ID	**Operation**	**Description**	**Ref. Element**
O-EC-AU_R	Registration of anonymous users	The registration form for anonymous users gives the possibility for users to register to the more detail energy consumption calculation and the tracking of the performance over time	E-EC-AU-R
O-EC-RU-CE	Access to current energy consumption status	This operation allows the user to access the current status of their energy consumption in the different transportation modalities. It requests the information from the energy consumption module.	E-EC-RU-CE E-EC-RU-CE-CI
O-EC-RU-HEC	Access to energy consumption historical information	The user can access previous consumption values to compare with current consumption and see their performance over time.	E-EC-RU-HEC E-EC-RU-HIEC-HC E-EC-RU-HIEC-HC
O-EC-RU-HIEC-HC	Change of period for historical information	By selecting a different period of interest for the historical information of the user, Tampere service will request the information to the Energy Consumption Module	E-EC-RU-HIEC-HC

O-EC-RU-In	Access to incentives (prices)	This operation allows the user to see the prices that is getting in their social networks like updates in their status to let their contact to know that they reduced their energy consumption.	E-EC-RU-In E-EC_RU_II
O-EC-RU-Tip	Access to tips	Based on the performance in the energy consumption of the users and the user preferences and profile, a set of tips and suggestion will be provided with this operation.	E-EC-RU-Tip E_EC_TU_TI

Table 105 – Integration of energy consumption status and suggestions - Operations

7.1.1.3 Interaction with the MoveUs Platform Services

Integration of ECSS	*INTERACTION WITH MoveUs PLATFORM*	*Last revision: 29/09/2014*

Operation ID	**MoveUs Service**	**Data Model Package**
O-EC-AU_R	SendRegistrationRequest	User registration
O-EC-RU-CE	SendCurrentEnergyConsumptionRequest (UserId)	Energy ConsumptionRecord
O-EC-RU-HEC	SendHistoricalEnergyConsumptionRequest (UserId)	Energy ConsumptionRecord
O-EC-RU-HIEC-HC	SendPeriodHistoricalEnergyConsumptionRequest (UserId)	EnergyConsumptionRecord
O-EC-RU-In	SendEnergyIncentivesRequest (UserId)	EnergyConsumptionIncentives
O-EC-RU-Tip	SendEnergyEfficiencyTipsRequest	EnergyConsumptionTips

Table 106 **- Integration of energy consumption status and suggestions – Interaction with the MoveUs platform services**

8 Additional specification of the common app

8.1 HMI of the common app

The following mock-ups, drafts or diagrams of the *end user interfaces* are foreseen as support for the implementation of the specific functionality.

The diagrams are simplified views of the final interface and shall basically provide the *guidelines* for the implementation of the final user interface.

ONLY the mockups for a limited set of functions are provided.

8.1.1 Main steps of the Trip Planning

The following picture depicts visually the interactions and involved user interfaces of the trip planning mobile service.

Only the main steps and operations have been included in this visualization.

The mockups have been designed by considering the case of registered users. Not all mockups may be applicable to the case of anonymous access.

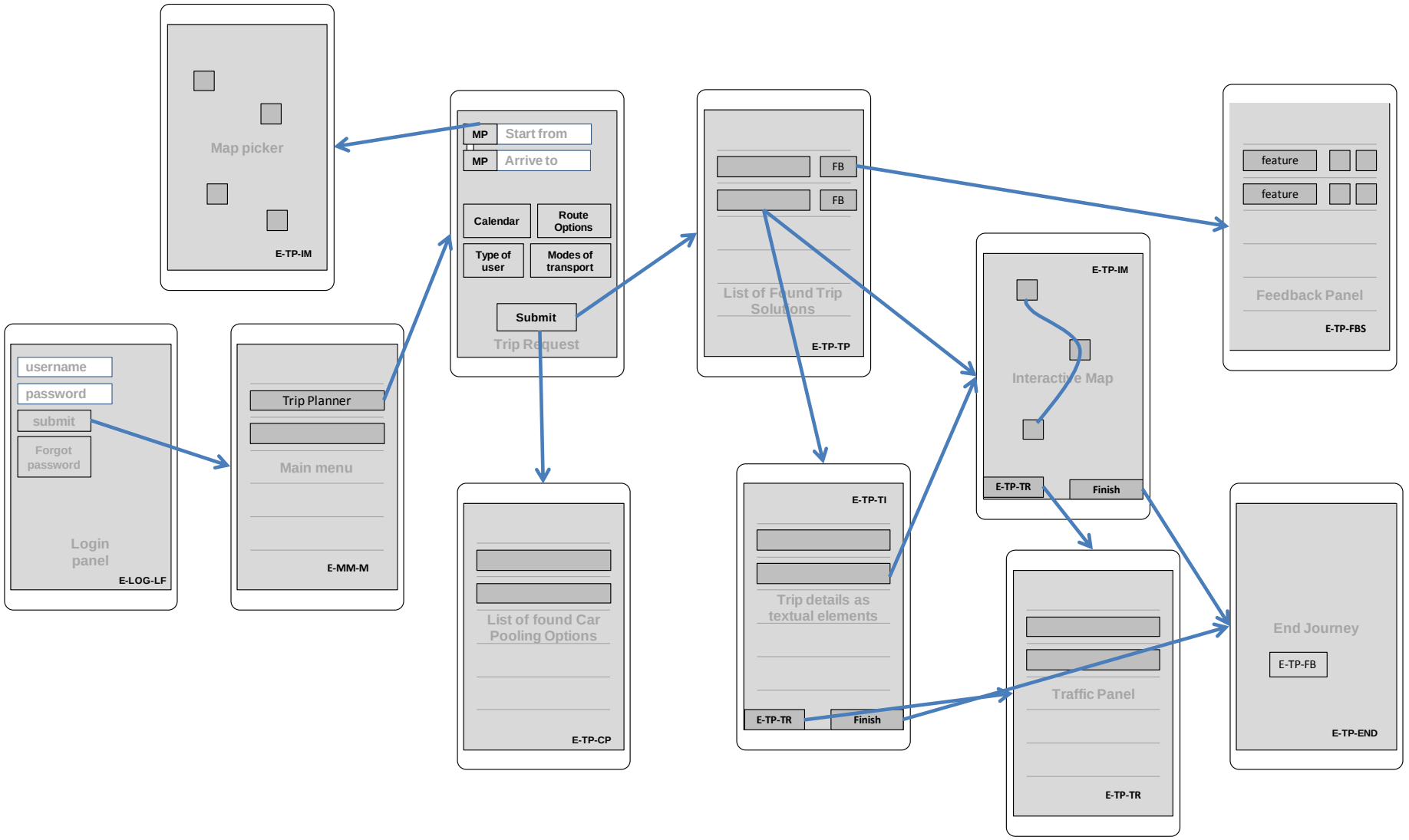

Figure 7 – Visual interactions of the Trip Planning Service

8.1.2 City-specific details - Madrid

8.1.2.1 Trip input data form

Specifically for the pilot of Madrid, the service will be provided on –trip, so there will not be date picker or time picker; the following picture shows the look of the trip input data form in the case of Madrid pilot.

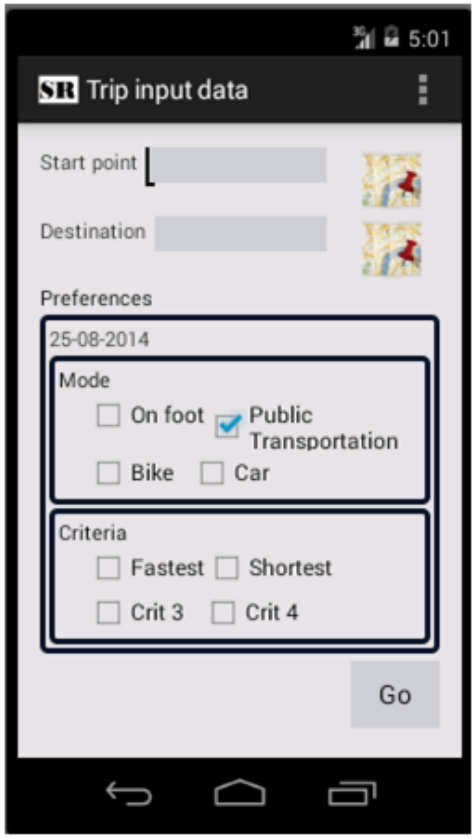

Figure 8 - Trip input data form for Madrid pilot

Another possibility for the trip input data form: to select the start and destination points over a map and the system will retrieve a route according to your preferences (as stated in the registration forms); afterwards, the route is shown in the map and icons for selecting different transport modes and criteria are enabled for the user. (no mock-up has been provided for this option)

8.1.2.2 Traffic Panel

Traffic panel shows the route that the vehicle is following and the updated levels of service by road legs. Besides that, the app. also shows the closest roads and their updated levels of service.

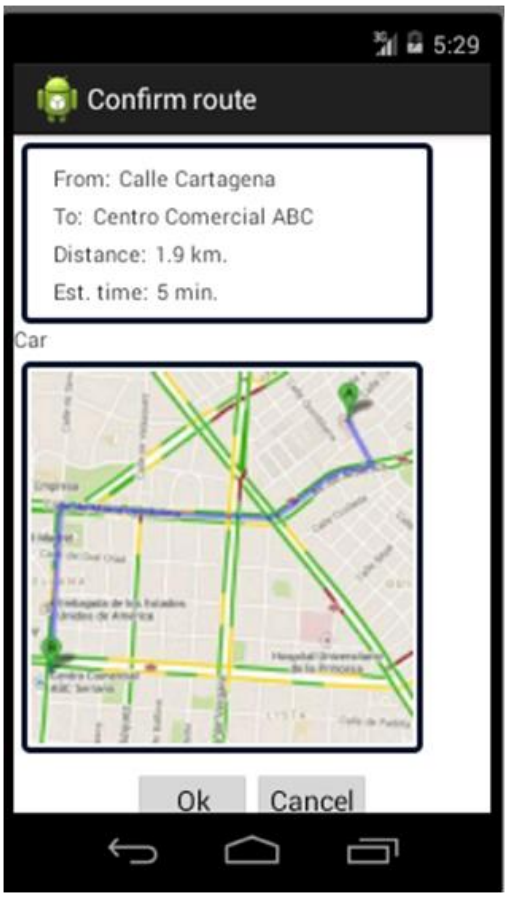

Figure 9 Traffic panel for Madrid pilot

In the traffic panel a message will pop-up to inform the car user that there is an incident in his route and offering re-routing on-trip, like in the following picture;

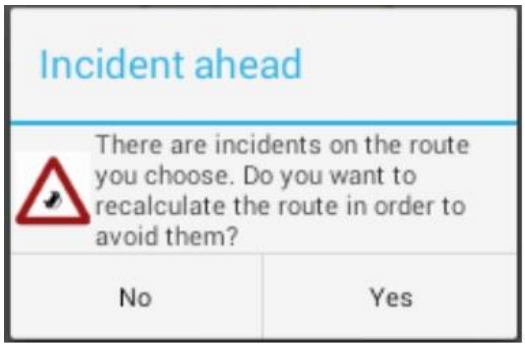

Figure 10 - Traffic warning message and option to re-routing

8.1.2.3 Trip confirmation panel

NOTE: For the specific case of route by car, the following screen should appear for Madrid pilot, after confirming the route offered by the common app.

Once the user has confirmed the route by car, a message will be shown to the user so as to select between the role of driver or passenger, like in the following picture;

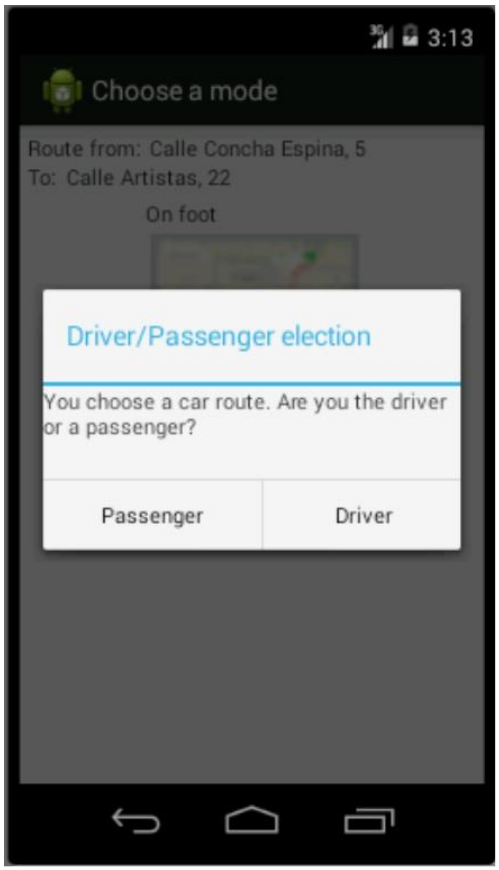

Figure 11 - Selection of car user role: driver or passenger

8.2 HMI of the specific City Services

8.2.1 HMI of Madrid City service 1: Smart prioritization of vehicles

The following mock-ups, drafts or diagrams of the *end user interfaces* are foreseen as support for the implementation of the specific functionality.

The diagrams are simplified views of the final interface and shall basically provide the *guidelines* for the implementation of the final user interface.

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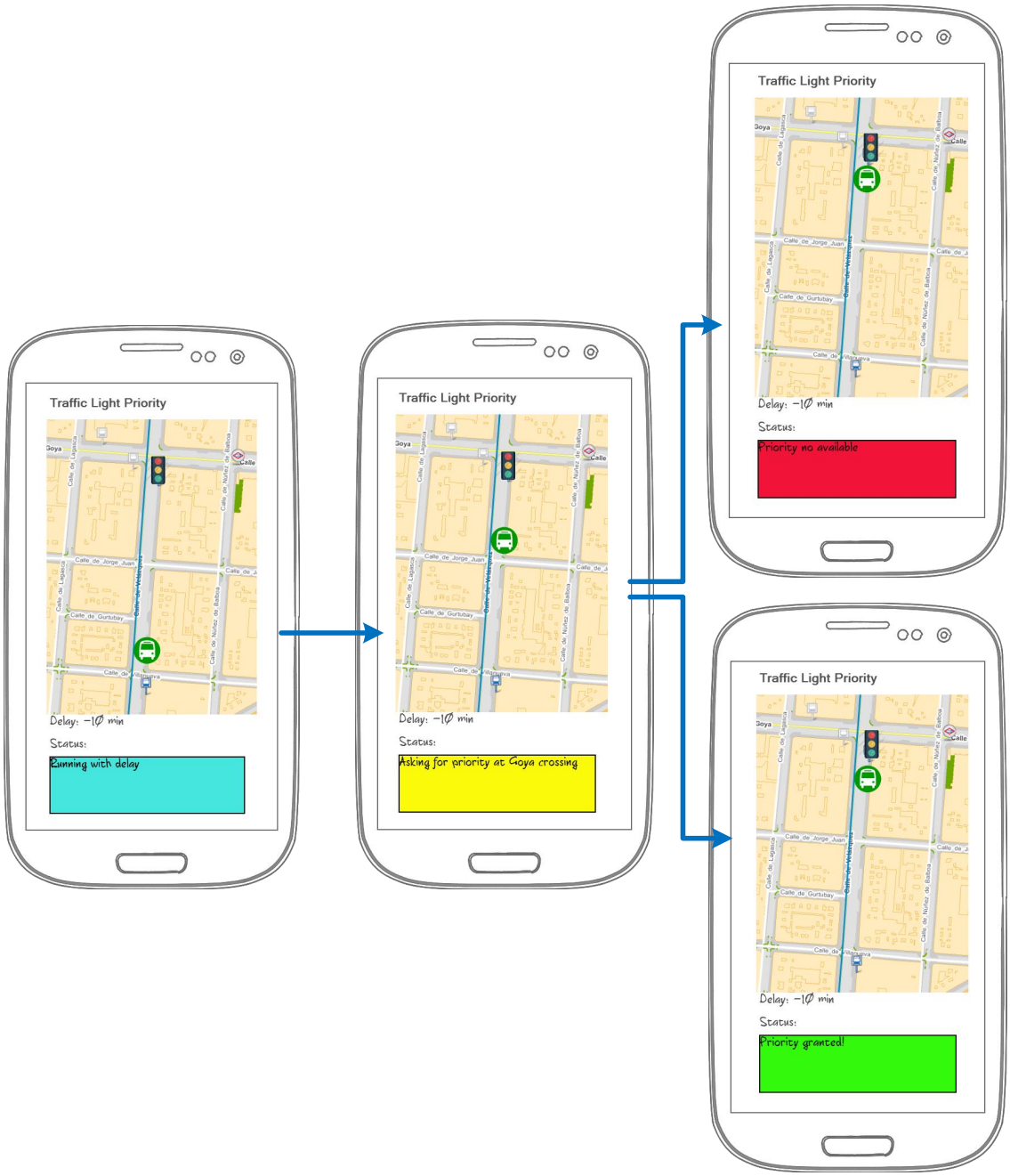

Figure 12 Mock-up of the smart priority of vehicles application

Under normal circumstances, the application displays the driver position and information of the delay / advance regarding the schedule in the following screen on the left.

If the delay exceeds a certain threshold, the application will start checking the position of the vehicle and contrasting it with the junctions that have traffic light priority service. Whenever approaching one of these crossings, the device will show the following screen on the right:

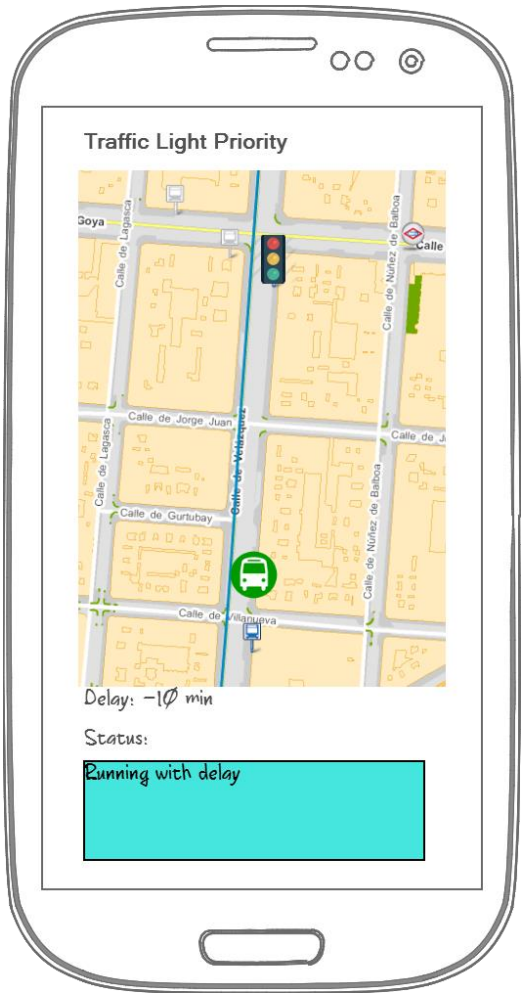

Figure 13 Mock up for the display of the bus position and delay/advance

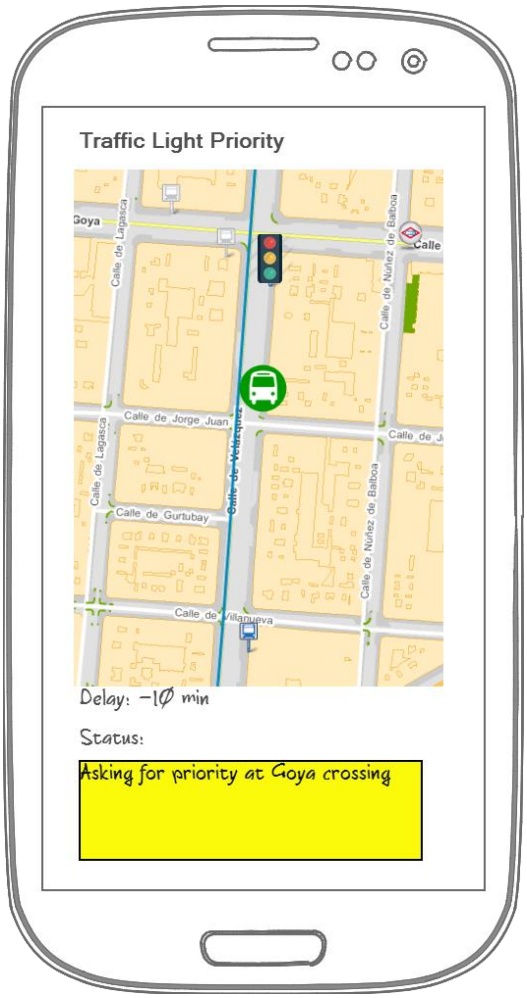

Figure 14 Mock up to inform the driver about the priority request

In the above screenshot the system has detected a junction with priority service and informs to the driver that it is consulting the platform MoveUs to check whether is possible to prioritize the bus either delaying the traffic light green phase or advancing the red one. Depending on the platform response the device would show two different screens:

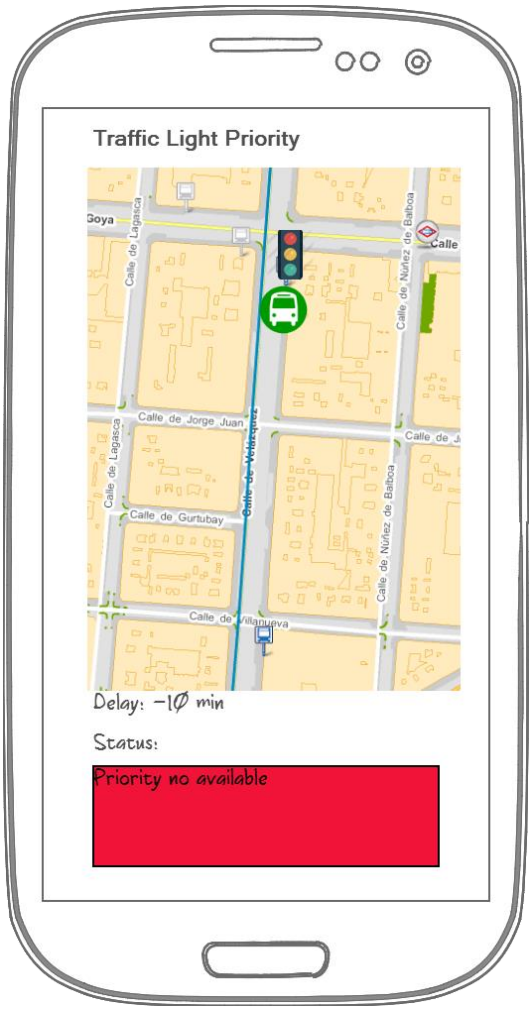

Figure 15 Mock up to inform priority is not available

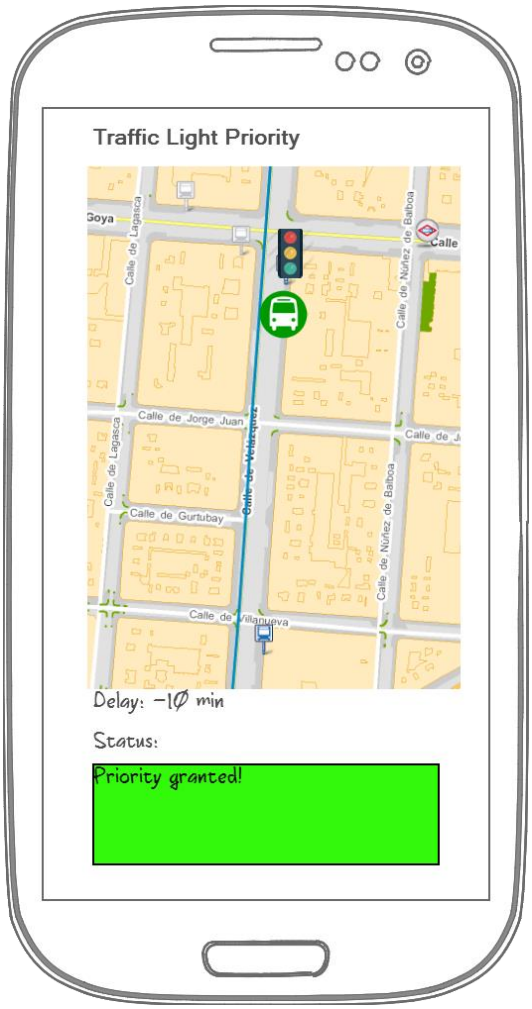

Figure 16 Mock up to inform priority request is accepted

On the left side the priority would not be available, and thus, the traffic light would work in the normal or regular way. On the right side, the priority is possible, so the traffic light modifies its normal functioning in order to provide priority to the bus, and communicating it appropriately. Once the bus has overtaken the junction, the device will communicate that fact to MoveUs platform so traffic lights will go back to their normal functioning.

8.2.2 HMI of Madrid City service 2b: Smart crossing for pedestrian

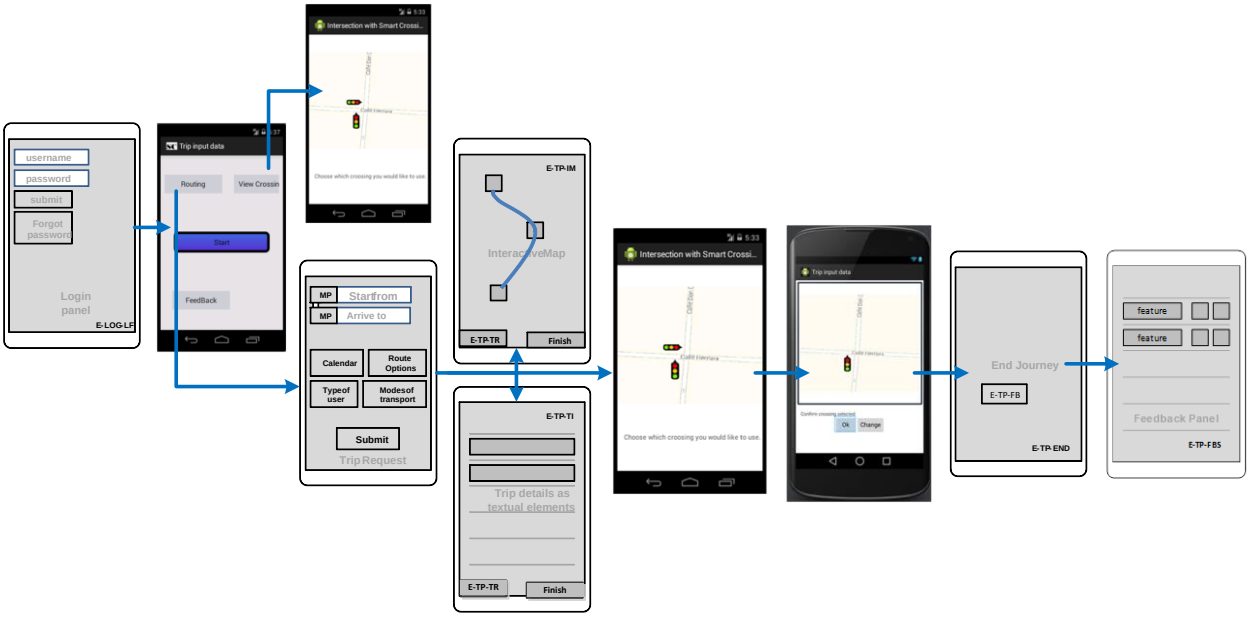

Figure 17 Mock-up of smart crossing for pedestrian application

Only some specific functionality mock-ups will be explained in detail in the following sections.

Smart Crossing (SC): Main Menu:

Figure 18 - Main menu of the smart crossing app

After pressing the view crossings button, the user will be directed to MoveUs common app, the interactive map panel, and will be shown a map with the smart crossings located; if the user selects a specific smart crossing in the map, a zoomed and detailed image of the crossing and the possible crossing directions will be shown, in line with the following picture:

Figure 19 - Panel to view the specific smart crossing details and select the crossing headed to by the user

After pressing the start button in the SC main menu, and in case the GPS and BT of the user's device is not enabled, the application will advise the user to activate them through a pop-up message. In the case the user has disabled the use of GPS and/or BT on purpose in the registration process, the application will ask the user to change the registration settings so as to provide the user with the service.

After pressing the Routing button in the SC main menu, the user will be directed to the MoveUs common app, Trip planning function where the user will request a route on foot; the user will be provided with the on-foot route option similar to the picture below:l

Figure 20 - Info of the selected route on- foot

When the user is approaching a smart crossing in his route, the application will automatically show the information of the crossing in a map, where the user will be able to select the crossing direction he is headed to by clicking to the arrows like in the picture below:

Figure 21 - Panel to view the specific smart crossing details and select the crossing headed to by the user

Once the user has clicked on the crossing direction selected, he will be asked to confirm the crossing demand, like in the following picture:

Figure 22 Panel to reaffirm demand for crossing

8.2.3 HMI of Genoa City service 2 - Integration of crowd-sourced data – administration tool

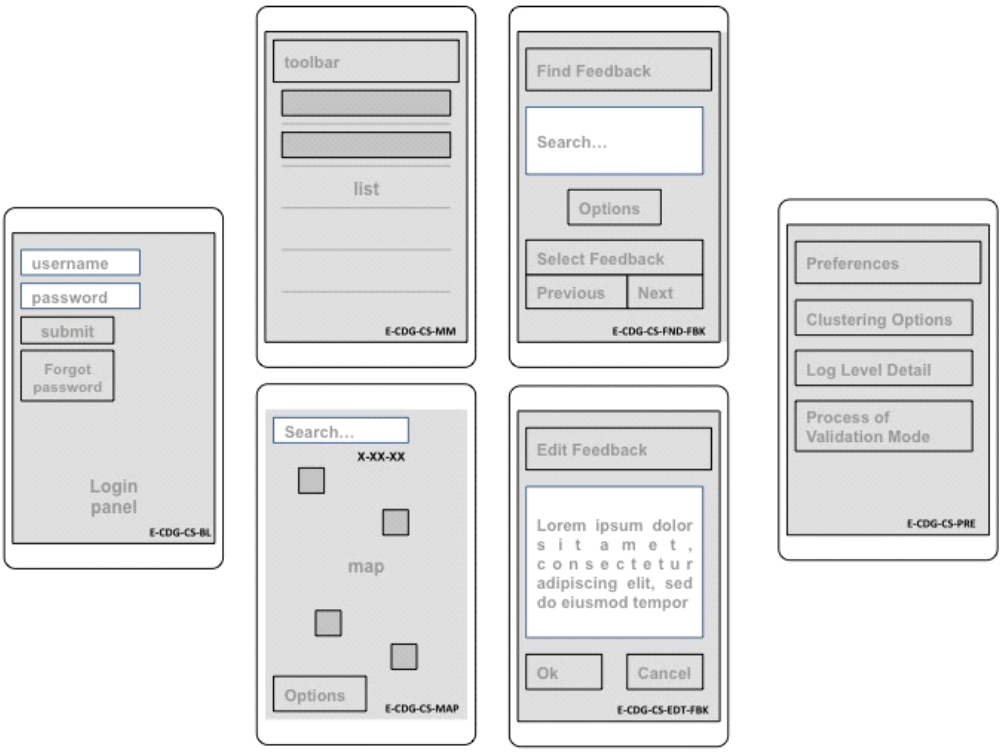

Figure 23 – Mockup of the administration tool for the integration of crowded source information

8.2.4 HMI of Tampere City service 2 - Energy consumption status and suggestions

There are two interfaces for the energy efficiency status and suggestion service. The first one is for users that are anonymous users. In this interface the user can have access to the carbon and energy calculator and at the same time he/she can simulate how much the values change if they decide to use more PT (public transport), the bicycle or walk instead of car. At the same time the interface invites users to register and track their performance over time.

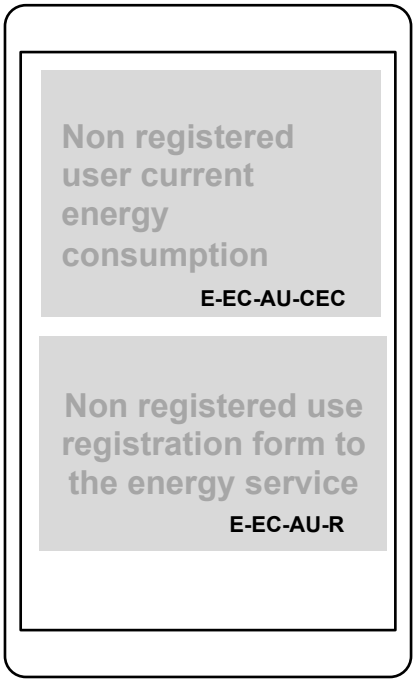

Figure 24. Mockup of the energy consumption status and suggestion for anonymous users

The second interface is for identified users, which are users that provide their information to the MoveUs platform to get incentives (prizes). This interface is divided into four parts: User's current energy consumption level (Your energy), Historical User's energy consumption level (History), Incentives (Prizes) and Energy tips (Tips).

1. User's current energy Consumption level: Is the users' total energy consumption, in this option the user can visualize his/her performance so far.
2. Historical User's energy Consumption level: the user can visualize their energy report each period of time (month, week, day) so it is easy to see him/her improvements
3. Incentives: incentives related with points or the energy level reach by the user
4. Energy tips: after the users know how and why they have used energy, this part shows them ways to reduce their consumption. Each time the platform can offer a different tip.
5. Additionally there is a module that the user can fill voluntary, so the system can personalize the tips as well other modules (maybe the visualization or the journey options)

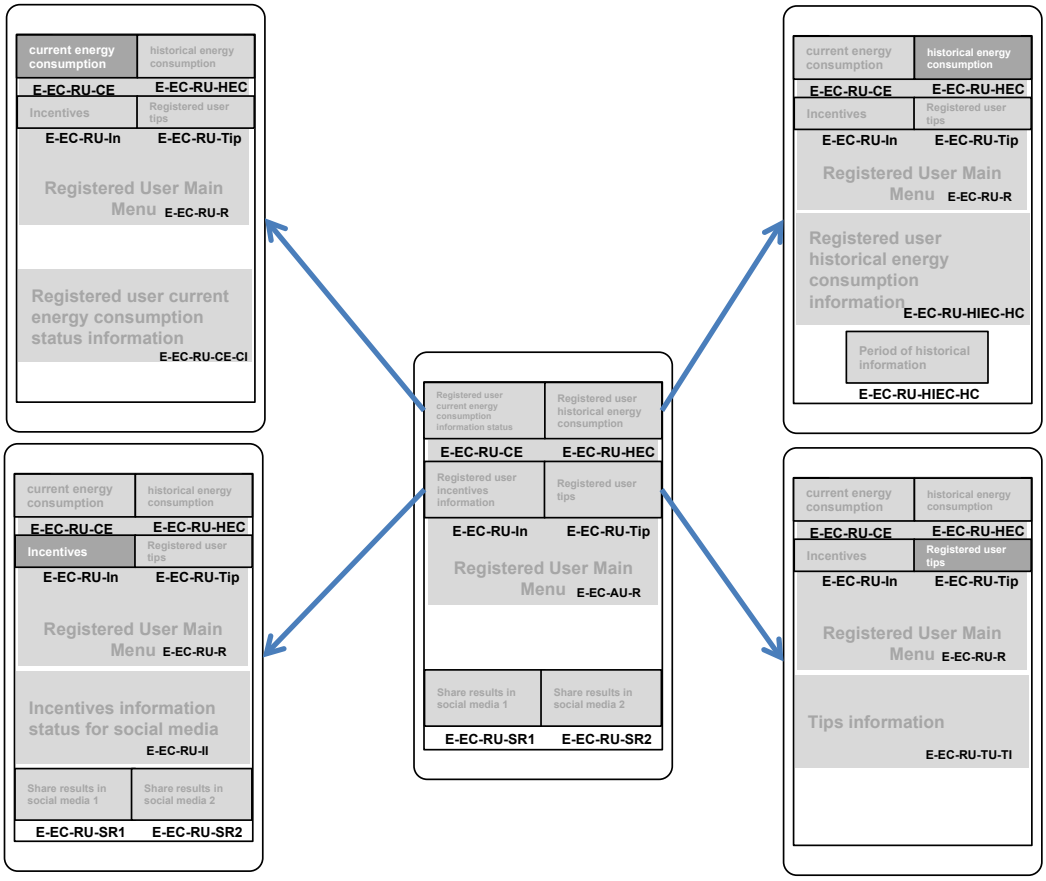

Figure 25 Mockup of the energy consumption status and suggestion for registered users

8.3 Common technological elements

The following additional common elements have to be included in the mobile app:

- Action bar at the top of the screen, accessible from anywhere in the app, with the following functionality:

Figure 26 - App action bar

1. App icon at the top left, establishing the app´s identity.
2. Screen title on the right of the app icon, also called the view control.

3. Action buttons section where the app´s most important actions can be demonstrated:
    - Search
    - Trip planner
4. Action overflow menu, serves as a menu button where less often used actions are placed, such as:
    - Send feedback
    - Settings
        - General options (e.g. selection of another city)
        - View and edit personal data
        - Open localization settings
        - Type of map (satellite – map)
    - Help
    - App info with link to the project´s website
    - Login/Logout

- Access to the app´s main navigation options, called the navigation drawer and accessible from anywhere in the app, by swiping from the top left edge of the screen or by touching the app icon from the action bar. The navigation drawer, overlays the content area of the app, but at the same time, the action bar remains visible and accessible. From there, depending on the pilot, content may be accessed such as:
    - Mobility information
    - Trip planning
    - Car-pooling Parking place location
    - Incentives-based tools
    - Credit status
- Back button (on the phone) as navigation element for going back in the operation flow

8.4 Logging

According to the Data Security and Privacy analysis (Deliverable 3.4) any event that happens in the users´ accounts must be logged in a data audit log e.g. a user registration must be logged; an administrator viewing a user´s account must be logged and if user´s route information was processed by the service this should also be logged.

8.5 Anonymous access, privacy and security

The user registration and the access to the city services as a registered user are needed for using a significant number of the functionalities. In general, the larger is the amount of additional information the user provides the higher will be the level of exploitation of the city services.

By choosing and using a personal user identifier -not necessarily associated to any personal information- a customized user experience will be possible.

As pointed out in the service description, it can be also envisaged to access the MoveUs services anonymously but in this case all functions based on a custom profile or referring to a specific user won't be available.

The details on the different options for using the services with anonymous access are given in the previous chapters.In general, the privacy and security aspects that must be considered and applied to all city services are analyzed and specified in details in the project deliverable D3.4. Therefore, as already stated in the introduction, the present specification should be regarded together with those of D3.4. This will drive the development of the security and privacy aspects applied to the different elements and operations specified for the city services.

8.6 Performance and optimization

The aspects of performance and optimization to be considered for the development of the City Servicers and possible KPIs to measure the performance are considered and briefly described in the present section.

Looking at the entire value chain of the MoveUs services, the overall performance of the city services is of course influenced by many factors that resides in the different scopes or levels of the chain, namely:

I. First level: access to the local systems:
   - performance of the local systems,
   - reliability of the connection
   - performance of the connection
   - performance of the local components (if any) realized on top of the local systems to provide the data to the MoveUs platform

II. Second level: MoveUs cloud-based platform:
   - Performance of the components of the platform
   - Efficiency of the entire cloud-based infrastructure

III. Third level: provision of the MoveUs platform services over the network:
   - Type and performance of the connection

IV. Fourth level: city services
   - Performance of the city services software

V. Fifth level: service provision over the public network
   - Performance of the network provider

VI. Sixth level: user device
   - Performance of the user device (e.g. browser, smartphone, etc.)

The optimization and performance criteria considered in the present section, for the city services is then restricted to the fourth level from the above list.

Considering the different technologies that could be adopted for the implementation of the services the following optimization criteria are listed and classified.

8.6.1 Optimization aspects

A few aspects that can be considered as starting points are briefly introduced in the following. It should be noted that some of these aspects are related to specific

technologies and environments (e.g. mobile solutions developed as web-based solutions). In relation to this, further specific optimization aspects can be investigated and considered during the implementation.

In introductory list of optimization aspects includes:

(very general aspects)

- Application of Software optimization techniques
- Database optimization and tuning (if a support database is foreseen for a city service)
- Optimization of memory usage like use of cache server side: part of the static data is stored on the server to avoid an overload of requests to the local systems
- Reduce the use of resources, avoid any image, library or object that is not necessary.
- Application of language-specific performance measuring tools

(more specific aspects)

- Server-side caching of dynamic contents (if applicable) based on efficient criteria
- Client-side caching of static resources, by using appropriate content expiration headers
- Evaluation of the advantages offered by inline resources (like JavaScript files) instead of external ones.
- Server-side compression of static resources like CSS, Javascript and HTML files by using the appropriate deflating (compression) modules or tools[16] and by setting the appropriate request/response headers.
- Use of minify versions of static files
- Merge of Javascript resources and CSS files into single files
- Compression and reasonable reduction of number, size and quality of images.
- Evaluation of the possibilities offered by CDNs for retrieving external resources.
- Consider the use of Server-Sent Events (e.g. the HTML5 APIs) allowing the browser to monitor a data source and get push notifications when a new event occurs.
- CSS-specific optimization like the use of sprites
- Use techniques (like AJAX) to update partially the page instead of a total refresh
- Optimize the HTML, CSS and Javascript code also by considering the client-side processing priorities and the execution of scripts (for example assign different priorities to scripts or contents that don't need to be retrieved immediately once the user interface is loaded)
- Performance evaluation with built-in browser tools
- Performance evaluation with On-line tools

It can be noted that for the optimization of the mobile apps the platform-specific developers guides and references (like the Android developers guide and the iOS

[16] Depending on the web server used

developer Library) provides the guidelines and resources for app optimization updated according to the most recent versions of the respective OS. Considering this level of specialization, any introductory note on mobile apps optimization, besides the more general ones provided at the beginning, seems to be out of the scope of the present analysis.

From the features identified for the city services, the following main aspects should be especially considered for the optimization of mobile apps:

- Map visualization and management
- Management of large lists of objects
- Web services and other remote data retrieval methods (e.g. JSON)

8.6.2 KPIs

The performance indicators have to be understood, again, by considering that the processing, data exchange and interactions occurs at different levels of the MoveUS Value chain. Therefore, appropriate measuring tools should be identified to efficiently evaluate the KPIs at the appropriate level (city service).

The following KPIs[17] can be considered:

Performance

- Loading time (time necessary to open and start using the software)
- Response time for the single functionalities, especially:
- Trip Computation
- Information retrieval

Usage

- Number of installations (mobile apps)
- Number of active installations (mobile apps, if the information is available)
- Number of accesses (web apps)
- Number of requests to the MoveUs platform (web apps and mobile apps)
- Other properties of the installations: country, language, device

Reliability

- Number of logged errors (web apps)
- Number of reported errors (mobile apps)

[17] KPIs relevant for a strictly technical validation are considered. The present analysis does not define any KPIs related to other validation aspects like user acceptance or satisfaction as this is not the scope for this kind of definition.

9 Conclusions

Produced starting from the main objectives of the project and with the architectural specification of the cloud-based platform as technical background and reference, the specification of the MoveUs city services gives the formal and concrete indications for the implementation of the software to be done in Work Package 6 and supporting the activities of the Living Labs.

The city services have been designed in a number of transport and traffic domains from the indications of the Cities' Use Cases to demonstrate the innovation, flexibility and effectiveness of the MoveUs concepts and solutions.

Innovative approaches and concepts have been introduced to achieve the objectives of mobile sustainability, improved transportation offering and reduction of energy consumption according to the initial plans. The solutions range from services supporting the users' decisions and behaviour in everyday travels to more customized components integrated in the local traffic infrastructures.

The MoveUs Trip Planner, for instance, has been designed by considering the advantages and possibilities offered by the MoveUs platform to create a complete, flexible and easy-to-use infomobility solution that extends the usual and common functions of a Trip Planner by integrating locally available information and services from several domains. Thanks to the MoveUs platform, the local offering is automatically and efficiently retrieved and activated on the basis of the user profile as well as with Geographical criteria.

Innovative elements like the use of incentives and the possibility of providing crowded-sourced data on various aspects of the MoveUs services have been also introduced, again relying on the specific and dedicated cloud-based features introduced by the MoveUs platform.

The incentives relates to the well-known problem of obtaining a concrete and incisive change in users' habits in terms of travel choices and modal preferences and has been addressed with the assignment of "virtual money" on the basis of the user's behaviour. Following the Incentives Model, introduced in the project work package 2, the virtual money (incentives) can then be used to obtain awards. A set of tools has been specified for the management of the entire process of incentives definition, provision, assignment from the different stakeholders involved in the operations.

The second innovative element (crowded-source information provision) aims at demonstrating the possibility of using feedback data from the user to enhance the quality of local offerings in terms of data and services. The feedback can be acquired, stored and processed by the cities and eventually used to generate new or improved information. A management tool (the feedback processing console) is defined to demonstrate the operations in the process of information delivery and usage, feedback provision, feedback processing and information enhancement.

The city-specific services in Madrid, aims at demonstrating the interesting possibility of applying the MoveUs concepts in scenarios where the traffic infrastructure and management operations are closely involved and affected. The Priority request and Smart Crossing services are examples of scenarios where innovative concepts and solutions for traffic optimization can be designed, developed and integrated on the basis of the MoveUs infrastructure.

The technical specification is produced with a neutral technological approach although for the concrete implementation activities and starting from an evaluation on usability, precise indications and suggestions have been provided in terms of target platforms and devices. The choice of a neutral approach is possible and justified because the MoveUs cloud, per se, does not impose specific technological constraints and make then possible the development of software products, even different in functionalities, features and concept, in the present and future stages. The city services defined here, in fact, can be considered just as one of the many possible software implementations possible thanks to the concept and facilities of the MoveUs architecture.

10 References

[1] MoveUs Deliverable D2.2 - Use cases, incentives-based model concept and common specifications for the pilots

[2] MoveUs Deliverable D3.1 - Data models, object models and ontology definition

[3] MoveUs Deliverable D3.2.1 - MoveUs cloud-based platform: specification and architecture

[4] MoveUs Deliverable D3.4 - Data Security & Privacy in the MoveUs system