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MOBiNET on Pilot site Trikala

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Authors

Katia Paglé, Fay Misichroni, Angelos Amditis (ICCS), Athanasios Giannopoulos, Vassileios Mizaras (INFOTRIP)

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Abbreviations and definitions

Abbreviation	Definition
3G	The third generation of mobile telecommunications technology
802.11p	An approved amendment to the IEEE 802.11 standard to add wireless access in vehicular environments (WAVE)
API	Application Programming Interface
AVL	Automatic Vehicle Location
B2B	Business-to-Business
B2C	Business-to-Customer
B2G	Business-to-Government
CA	Communication Agent
CAM messages	Cooperative Awareness Messages
CANBUS	Controller Area Network Bus
CM	Communication Manager
CO ₂	Carbon Dioxide
CP	Content Provider
CSV	Comma-separated values
DaR	Dial-a-Ride
DATEX2	Standard developed for information exchange between traffic
DQA	Data Quality Assessment
DRT	Demand-Responsive Transit
ETA	Estimated Time of Arrival
FTP	File Transfer Protocol
FTS	Fix Traffic Sensor
FVD	Floating Vehicle Data
G5	European Standard for ITS operating in 5 GHz frequency band
GPS	Global Positioning System
GPRS	General Packet Radio Service
GTFS	General Transit Feed Specifications

GUI	Graphical User Interface
HSL	Helsinki Regional Transport Authority
HTTP	Hypertext Transfer Protocol. An application protocol for distributed, collaborative, hypermedia information systems.
IDM	Identity Manager
IP	Insurance Providers
ITS	Intelligent Transportation System
NMP	National Mobile Payments
OBD	On-Board Diagnostics
OBU	On-Board Unit
O/D	Origin/Destination
POI	Point of Interest
R-ITS-S	Road-side ITS-Station
RDS	Radio Data System
REST	Representational state transfer
RSU	Road Side Unit
RWW	Road Work Warning
SD	Service Directory
SDK	Software Development Kit
SLA	Service Level Agreement
SOAP	Simple Object Access Protocol, a protocol specification for exchanging
SP	Service Provider
TIC	Traffic Information Centre
TLC	Traffic Light Control
TMC	Traffic Message Channel
TPEG	Transport Protocol Experts Group that developed specifications for
TSP	Telematics Service Providers
TTS	Text-To-Speech
USDL	Unified Service Description Language (see also Linked USDL above)
V-ITS-S	Vehicle ITS-Station
Wi-Fi	Wireless local area network (WLAN) products that are based on the

XML	Extensible Mark-up Language
B2B	Business-to-Business
B2C	Business-to-Consumer
MMTA	Multimodal Travel Assistant; MOBiNET use case

Executive Summary

This document provides an overview of the activities performed at Pilot site Trikala during the MOBiNET project. The document was first drafted early on in the project to provide a description about the area and what kind of interests, stakeholder needs and available services there are. As the use cases to be implemented and used as validation and demonstration tools were selected and defined, they were described in the document.

Throughout the project, the document has been updated several times by adding and documenting validation plans and results collected for the different platform releases. At the end of the project, the previously “living document” was updated from an Internal Report into a final pilot site report deliverable. In addition to the pilot use cases and validation activities, the report also includes a summary of the exploitation at the pilot site on engaging local stakeholders to incorporate their needs into the platform design, to understand and evaluate the platform potential and to attract potential future users to it.

The services deployed at the Trikala pilot is the Multi-Modal Travel Assistance service (MMTA) and the Parking services. The MMTA provides multimodal journey planning to end-users at different project pilot sites, by combining existing routing solutions. Pilot Trikala provided the contents for the Trikala pilot site (such as bus timetables, location of the bus stations and bus routes), via .xml files that contain the abovementioned information.

Parking services comprise of a B2B Parking data service and a B2C Parking service. The B2B Parking data service collects real-time parking information from a number of car parks and makes them available. The B2B Parking data service for Trikala is registered at the MOBiNET platform in order to offer the possibility to other services or applications to use the available parking data. The B2C Parking service (through the MOBiNET platform) uses the real-time parking data of Trikala as a B2B service. The Trikala B2C Parking service offers 4 different parking features to the end user including Route Guidance to nearest free parking bay, Automatic GPS based parking payment, Time-limited parking assistance and Find my parked car. Through the implementation and validation of this use case we show that the same B2C service can easily use data provided by different European city (given that the format used is compliant) and therefore this adds to the envisioned pan-European coverage, plus the fact that the local authorities can easily put the data in the MOBiNET service directory to reach a wide and broader community which opens up the possibilities for the provision of innovative solutions to citizens.

The selected use cases have been implemented and validated at Trikala. Detailed descriptions of the implemented services and validation results, as well as feedbacks from local stakeholders, and specifically taking their needs into account to showcase how the platform addresses those interests have been given in this report. The implementation and validation have been carried out for different releases of the MOBiNET Platform.

1. Introduction

1.1. Purpose, scope and target audience of this report

The purpose of this document is to provide a description of the MOBiNET pilot cases realized at the Pilot site Trikala. It provides a description of the region and relevant pre-existing traffic and mobility content and services that are used as inspiration and basis for the pilot use cases. The document also explains the nature and implementation of the use cases selected and further defined during the project that serve as the basis for stakeholder needs and platform requirements.

During the project, this document has served as a description of the Pilot site Trikala for the consortium for understanding the planned use cases and stakeholder interests (e.g. for the requirements process) as well as for documenting and reporting validation plans and results throughout the different platform releases (complementing different validation questionnaires and providing conclusions). That is, it has been a live document, updated throughout the project lifetime according to new information. In the end, it serves as a final report for the activities done at Pilot site Trikala.

1.2. Structure of the document

Chapter 2 provides an overview of the Trikala pilot site. For describing the context of the Trikala city itself, it includes a description of the area, what types of (public) transport and mobility services and information is widely available. For the pilot activities, the pilot stakeholders and introduced and the planned, implemented and validated service use cases are described. The use cases are related to the overview of the presented available content. The chapter also describes the main objectives of the pilot.

In Chapter 3, the general methodology that is applied for the validation procedures in the Trikala pilot is provided, including limitations and clarification of intended scope.

Chapter 4 gives an overview of the validation plans and scenarios applied throughout the project at the Trikala pilot. Then, the chapter also includes summarised conclusions of the different validation phases for different platform releases. The chapter ends by providing a collection of the recommended development needs based on the final platform state as experienced in the validation.

Then, Chapter 5 provides an overall summary of the validation results and how well the pilot objectives were achieved. The conclusions are provided for each service use case and central platform feature that were used and validated at the pilot site during the project.

In Chapter **Error! Reference source not found.**, a summary of exploitation and (local) stakeholder engagement activities are given to indicate identified points of interest that have been raised through presenting, discussing and demonstrating the MOBiNET concept with external stakeholders.

At the end of the document, detailed plans for the validation scenarios and tested functionalities and requirements are listed along with validation documentation (i.e. identified issues, remarks, etc.) for the different validation phases are included as appendices.

2. Pilot site Trikala

2.1. Description of the area

Trikala is a medium sized provincial city in the middle of Greece with a population of about 76,000, which approximates 100,000 including the suburbs and the close villages (according to the National Statistical Service, 2011).



Figure 1 Trikala pilot site

2.2. Transport and mobility content and services in the area

Trikala at a glance:

- 35 km of fiber optic installed; 34 Wi-Fi nodes of free internet access for over 10000 citizens and visitors of the city; 31 operational e-services; fully interactive Geographical Information System
- 900 e-parking places and 4 parking information signs (see “mobiPARK” parking system details at <http://www.e-trikalagr/en/node/61>)
- 5 inductive loops measuring traffic data (the traffic data can be provided to MOBiNET)
- 20 municipal vehicles and 25 public buses equipped with OBUs / GIS positioning systems; 25 public transport information signs installed at central bus stops (the GIS data and the public transport information can be provided to MOBiNET, while the municipal vehicles and public buses can be recruited as participants for the MOBiNET pilot along with the other recruited users of the MOBiNET services).

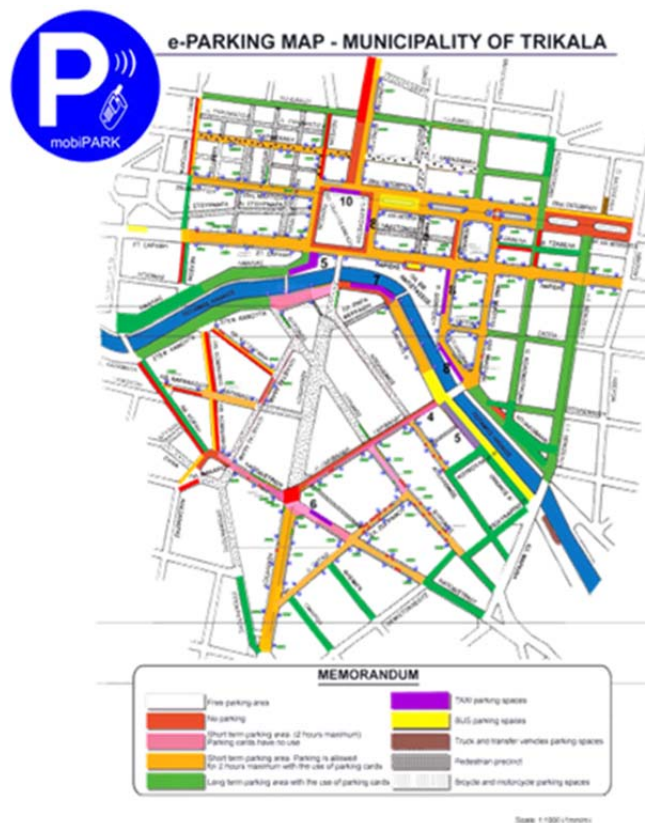


Figure 2 Trikala mobiPARK parking system

2.3. Pilot site partners

The project partners in the Trikala pilot were ICCS and INFOTRIP, who were responsible for planning, implementing, testing and validating the use cases and platform as well as reporting the activities.

Table 1 Contact persons for the Trikala test site

Trikala Pilot Site				
Main contacts	Role	Name	Email	Phone
	Coordination; Implementation of parking services	Angelos Amditis	a.amditis@iccs.gr	+30 210 7722398
		Katia Pagle	katia@iccs.gr	+30 210 7722466
		Fay Misichroni	fmisi@iccs.gr	
	Contribution to implementation of MMTA services	Vassilis Mizaras	vmizaras@infotrip.gr	+30 2310 478426
		Thanos Giannopoulos	tgiannopoulos@infotrip.gr	+30 210 6511690

In addition to the project partners, the Trikala pilot has involved local stakeholders in the pilot discussions since the proposal phase of the project. This activity was formalised by announcing eTRIKALA as an associated partner for the MOBiNET project in pilot site Trikala, taking their needs and interests into account in defining the use cases, and thereby ensuring wider applicability of the functionalities that are validated. The use cases and how they relate to local stakeholder interests are described in the next section (2.4) while further examples of stakeholder engagement are reported in section **Error! Reference source not found.**

2.4. Service use cases for validation and demonstration

The services deployed at the Trikala pilot is the Multi-Modal Travel Assistance service (**MMTA**) and the **Parking services**. The service use cases used for validation in the Trikala pilot are related to the topic areas introduced in section 2.2. The selected use cases listed below are described in the following sub-sections (2.4.1–**Error! Reference source not found.**2). Besides validation, the use cases serve as the basis for demonstrating and discussing the platform with local stakeholders, and specifically taking their needs into account to showcase how the platform addresses those interests.

Beyond the descriptions in this document, further details on the benefits and added value realized in the services by using MOBiNET have been reported in *D7.15 Report on services developed for MOBiNET* (Capato et al. 2016).

2.4.1. Multimodal Travel Assistant (MMTA) backend

The Multimodal travel assistant was demonstrated at the Trikala pilot site with Release 2. Functionality consists of a service aimed to support the traveller by offering routing calculation, mobility information and e-ticketing. The service concept consists of exploiting the potentiality of the MOBiNET platform, in order to simplify the chain from content provision to end user application passing through the usage of existing local travel planner but guaranteeing just one “look-and-feel” to the end user.

The service is composed by a MMTA app which is the end user interface for the mobile device and by a multi-layer service which is composed by a MMTA broker and several MMTA backend modules.

The MMTA App is the MMTA service frontend. It consists on an end user interface, able to collect needed information from the end user and to publish the results on the end user’s device. In particular the app guarantees to the end user a common “look-and-feel” for the different multimodal services.

The MMTA broker is a connection layer from the frontend to the backend services. It dispatches the request to the correct backend module. If the functionality of the MMTA app is to harmonize the “look-and-feel”, the functionality of the MMTA broker is to make homogeneous functional differences related to different multimodal services.

The functional architecture of the MMTA service specific to the Trikala pilot site is visualized in the figure below.

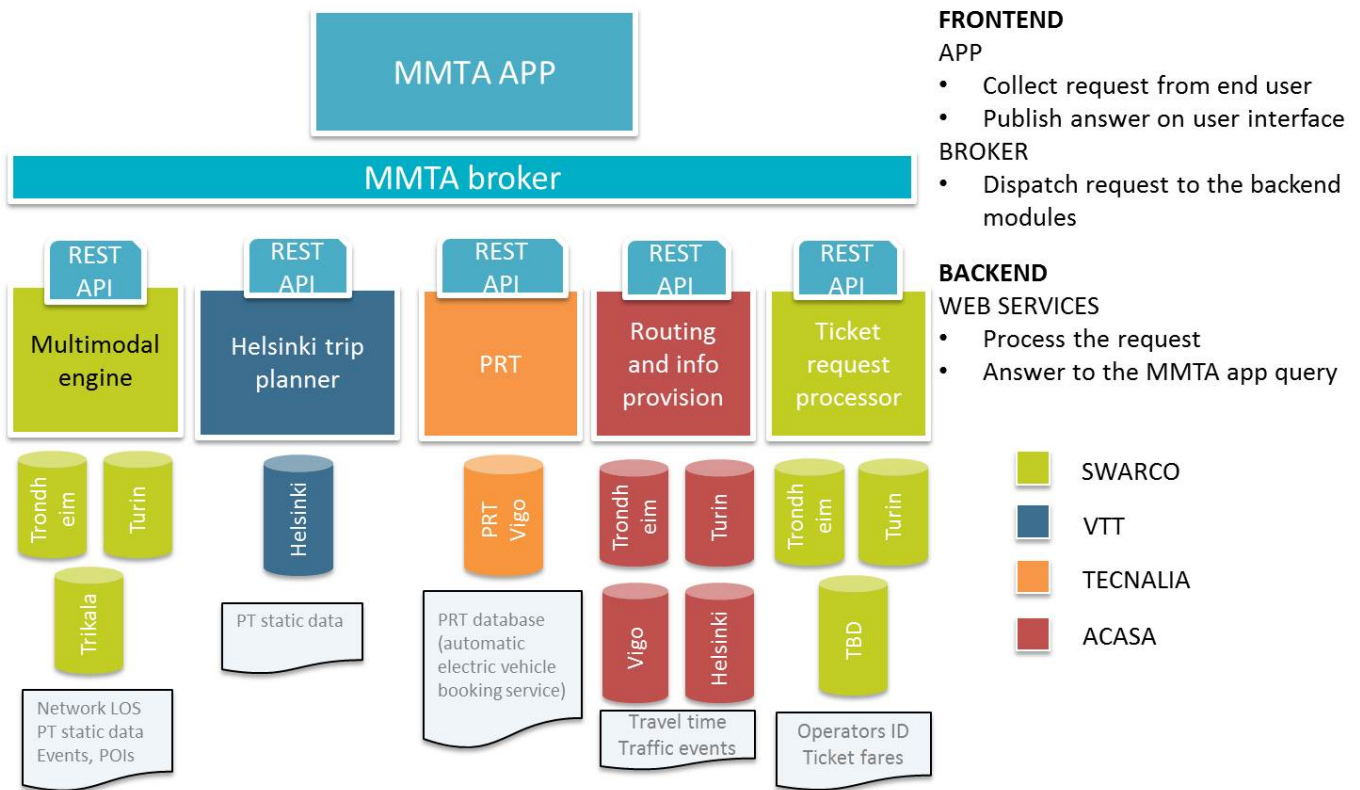


Figure 3. The MMTA service general architecture.

In the context of Release 1, there was no demonstration of any component/module of the MMTA service since the components planned to be integrated at the Trikala pilot site were developed by the MMTA working group during Release 2.

In the context of Release 2, contents that are specific to the Trikala pilot site such as bus timetables, location of the bus stations and bus routes were made available by INFOTRIP and integrated to the MMTA service. This was achieved by creating .xml files that contain the abovementioned information which was then integrated with the Multimodal engine module of the MMTA service. Furthermore, the Multimodal engine module, the MMTA App and the MMTA Broker were adopted and integrated at the Trikala pilot site as depicted in Figure 9.

Finally in the context of Release 2, additional functionality was added / integrated in the Multimodal engine module as well as the other two modules that were implemented at Trikala, namely the MMTA App and the MMTA Broker. Release 3 was used for further optimisation of the implementations in Trikala

2.4.1.1. Adaptation for MOBiNET

The following functional adaptations were implemented for achieving the functionality of the MMTA service for Trikala:

- The format of the content data required by MMTA from the pilot site, such as bus timetables, location of bus stops, bus routes etc. were adapted according to the needs of MMTA in order to be available for integration with the MMTA application.

Standards that were used for the implementation of the MMTA service include the Institute of Electrical and Electronics Engineers' (IEEE) 802.11 standards for Wireless local area network (WLAN) products.

2.4.2. Parking services

The Parking services implemented for Trikala include a B2B Parking data service and a B2C Parking service.

The B2B Parking data service was developed by ICCS and its purpose is to collect real-time parking information from a number of car parks and to make them available. The format used is compliant with the format published in MOBiNET (which is defined on the MOBiNET dashboard).

The B2B Parking data service for Trikala is registered at the MOBiNET platform in order to offer the possibility to other services or applications to consume the available parking data.

The B2C Parking service was developed and registered to the MOBiNET platform by the North Denmark Region consortium partners. Through the platform, the B2C Parking service uses the real-time parking data of Trikala as a B2B service. The Trikala B2C Parking service offers 4 different parking features to the end user:

- Route Guidance to nearest free parking bay,
- Automatic GPS based parking payment,
- Time-limited parking assistance and
- Find my parked car.

The service was originally developed in North Denmark and then migrated to pilot site Trikala, to demonstrate the added value of the MOBiNET platform for public authorities and cities.

Through the implementation and validation of this use case we show that the same B2C service can easily consume data provided by every European city (given that the format used is compliant) and therefore this adds to the envisioned pan-European coverage, plus the fact that the local authorities can easily put the data in the MOBiNET service directory to reach a wide and broader community which opens up the possibilities for the provision of innovative solutions to citizens.

2.4.2.1. Adaptation for MOBiNET

The following functional adaptations were implemented for achieving the functionality of the Parking services

- The format of the content data of the existing Trikala parking services, was adapted according to the needs of the Parking Services which are migrated from the North Denmark Region. The data were published in the specified format in the service directory. The format used was defined in collaboration with the North Denmark Region.
- The use case, functional requirements and the implementation specification were adapted in order to allow exploiting the functionality of the billing component in the Trikala use case. The work was performed in close cooperation with partners GateHouse, AAU and NDR (who are responsible for the implementation of the Parking services in Aalborg) as well as Pluservice (responsible for the implementation of the billing component). Towards that end, the B2B Parking

service API was updated to support the “parking roaming” use case, which is possible with the updated version of the billing component that was released with R4.0.

- The connection with the Trikala management centre was adapted to serve the needs of the parking use case in Trikala; this included redesigning the management of the users’ back end, to make it compliant with the MOBiNET Parking services philosophy, allowing also the conduction of tests with users.

In order to enable the functionality of the Parking services in Pilot site Trikala it was necessary to buy/set up the following elements:

- End-user devices: smart phones
- 3G connection for mobile devices
- Internet connection (high bandwidth for service provider) / firewall adaptations

2.5. Pilot objectives

The objective of the Trikala pilot is to participate in the concept design, to validate it and thereby be able to demonstrate the technical functionalities and benefits of MOBiNET.

The participation in the design is done through the development process which starts from the requirements derived from use cases and needs defined for the pilot sites. The general technical solutions that the Trikala pilot expects the platform to achieve are the following:

- Centralized marketplace or portal for publishing and making discoverable relevant transport and mobility content and services in a structured manner. This is validated by the publishing of the Parking B2B data services.

3. Methodology

3.1. Responsibilities of the pilot site

Testing is often divided in verification and validation. To put it simple, one could put it like this:

- Verification: Are we building the product right?
- Validation: Are we building the right product?

In software development, the IEEE definition states (Verification and validation, 2013)

- Verification: The process of evaluating software to determine whether the products of a given development phase satisfy the conditions imposed at the start of that phase. [IEEE-STD-610].
- Validation: The process of evaluating software during or at the end of the development process to determine whether it satisfies specified requirements [IEEE-STD-610].

In (D51.1 Validation and Assessment Guidelines) this has been interpreted in terms of the MOBiNET scope:

- **Verification** determines if the MOBiNET platform and services are consistent and perform the selected functions in the correct manner. Using a bottom-up approach verification ensures whether the requirements of the functional specifications at the higher levels are fulfilled. In general, verification addresses the requirements of what MOBiNET needs to consider for the design of its services and platform. For that, they need to be verified before deploying the services.

In the project, verification is done by Pilot site Helmond.

- **Validation** analyses if the right platform and innovative services have been built, i.e. whether MOBiNET's platform and services comply with the objectives and perform the functions for which they were intended for, by assessing hypotheses and success criteria statements. Validation checks, using a top-down approach, the performance and effectiveness based on selected performance indicators. Validation addresses the effects of the innovative services: meaning how effectively the services respond to identified user (stakeholders) needs. As a consequence, the validation categories are always addressing the effects of the services in, for instance, social or environmental aspects.

In the project, validation is done by the Pilot sites after verification has been performed by Pilot site Helmond.

In (D51.1 Validation and Assessment Guidelines) the different roles are visualised as shown in Figure 4.

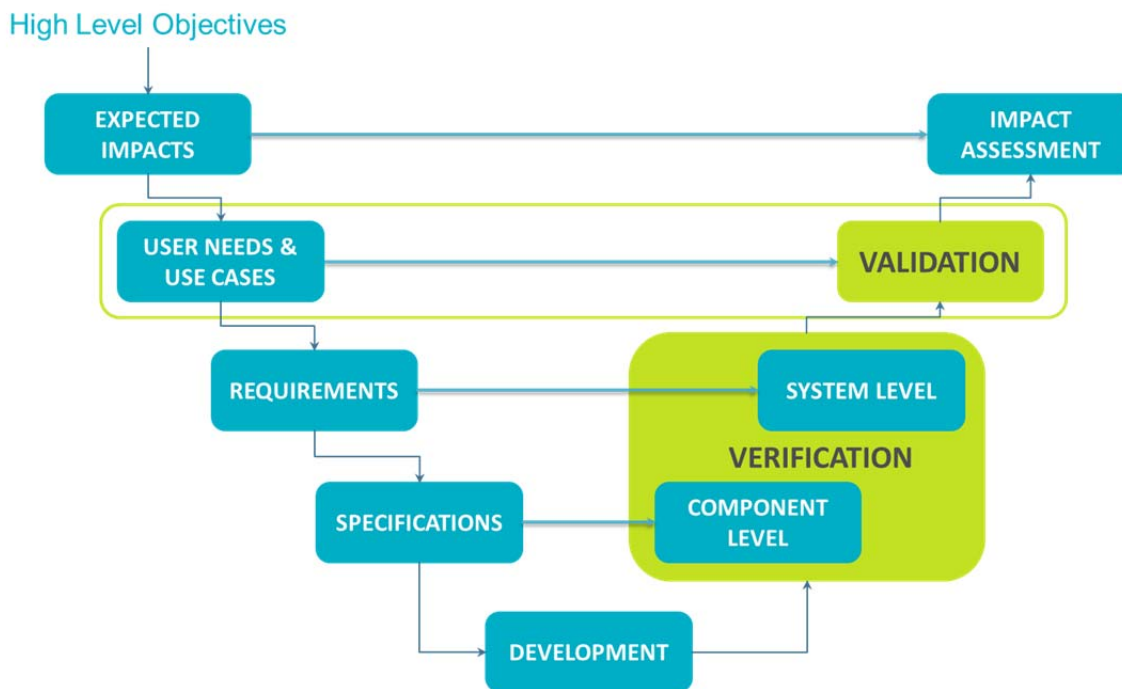


Figure 4: MOBiNET development processes and relationships (D51.1 Validation and Assessment Guidelines).

Validation addresses the hypotheses derived from needs and use cases of the users. Users being any stakeholders involved in using the platform; meaning service providers, service developers, business users and end consumers. The validation at the pilot sites, therefore, focuses on whether the needs and requirements of those stakeholders are met by the platform.

The validation is cyclical process linked with the platform development phases. For each platform release, the pilot site prepares validation scenarios according to the use cases and user point of views at that site. The validation scenarios and results from using and testing each platform release are added to this document. That is, the same “living document” is appended and used as Internal Reports until it is finalized after the last release.

3.2. Methodology of Pilot site Trikala

As explained in the previous which gives an overview on the verification and validation approach in the project, the platform testing activities at the pilot sites are limited to validation, apart from Pilot site Helmond which does verification prior to the validation phases. And more specifically, the validation at each pilot site is based on the requirements and needs derived from the stakeholders and use cases at the site.

For Pilot site Trikala, the validation scenarios, which reflect local stakeholder needs and interest, are based on the services described in section 2.2. The validation scenarios are introduced in 4.1 and thoroughly defined in 0. These use cases cover different user roles:

- Service provider
- Service developer
- End user

The validation scenarios cover validation of the requirements (stored as user stories in JIRA) that are considered important in the context of Pilot Trikala from the different user role aspects (listed above). These requirements cover:

- service specific requirements related to development and provision of services, and
- general requirements related to general usability and usefulness of MOBiNET as seen from the different user roles.

As the validation in Pilot Trikala concentrates on the platform usage it encapsulates the selected requirements in the tasks users performs in different roles. Scenario definitions in 0 map these requirements (user stories in JIRA) to different tasks and the requirements guide validators in their validation tasks. Validators compare the usage experiences with MOBiNET to the requirements and report their subjective view on how well the requirements are met. Furthermore, they are asked to pinpoint missing features, report the problems encountered as well as propose enhancements.

3.3. Limitations and out-of-scope

Pilot site Trikala validation concentrates on the platform usage in the context of services and applications developed, deployed and used in the context of the pilot. Additional development to the service use cases just to incorporate unintended features (e.g. ITS-G5 connection support for non-vehicle related services) is neither meaningful nor resource efficient. Thus, requirements that are not related to the use cases at Pilot site Trikala or as general functionalities of the platform (e.g. using the graphical interfaces or search functionalities) are omitted from the validation scenarios.

The use of MOBiNET for the use cases at Pilot site Trikala do not include functionalities that would be visible to the end user, apart from using the platform as a graphical interface for discovering the services. Therefore, the end user point of view in the validation is limited to the general platform functionalities, such as login and identity aspects, and searching functionalities. Similarly, while the services may in the end lead to different types of impacts (e.g. reduction of emissions by providing information that helps travellers make more sustainable choices such as avoiding congestion or opting to use public transport), the effects are related to the integrated content and services as well as the users themselves. The objective in the project is limited to validating and proving that different content, whatever it may be, can be more easily integrated and that the services can be scaled to new areas with lesser efforts thanks to MOBiNET. That is, the aim is to prove generally usable functionality and business value for the use cases. Whether or not for example environmental friendliness or increased safety are relevant to the service or considered selling points is then up to the different providers (e.g. how to design non-MOBiNET related features or how to display and prioritise given information).

4. Validation

This section first presents an overview of the validation plans and scope (section 4.1), and then the results and conclusions for the different validation phases during the project (sections 4.2-4.5). The final conclusions, results and recommendations related to the main ways of using the platform are presented in **Error! Reference source not found.5**.

While new requirements (and additions or clarifications for old ones) were collected during the validation of each platform release, the identified new requirements are not documented in this report. The requirements were collected through online questionnaires and passed directly to the validation team to provide in the validation result reports and to the requirement process in the project.

4.1. Validation plans

The general methodology towards validation is explained in Chapter 3. The *D51.2 Validation and impact assessment plan* provides more specific instructions on what functionalities and requirements should be validated and what information and data should be gathered at the pilot sites. The *D52.3 Guidelines and trial plans for pilot validation* document provides instructions and examples on how to identify and utilise the right information (e.g. what requirements should be validated and what data should be gathered at the pilot site). Based on this, the Pilot site Trikala has elaborated four validation scenarios that are used to guide the validation work. For Pilot site Trikala, the focus was on the validation of the requirements related to the local implementations of the Multimodal Travel Assistant (MMTA) and Parking services as well as general platform functionalities (that are not related to specific service features and development).

In the use case specific validation, the responsibility of the validation falls for those realizing use cases in the MOBiNET project. That is, those who have presented the needs and requirements and are therefore able to evaluate whether the intended objective has been achieved. The general platform validation could be done by anyone in the project, and provided more information on user experience and needs. At Pilot Trikala, the following five validation scenarios were used to guide the validation work (Table 2).

Table 2. Pilot site Trikala validation scenarios

#	Scenario	User role	Validation context
1	Create MOBiNET OpenID and Manage identity	Service provider	Description: General platform functionalities. Create MOBiNET OpenID and manage identity (in simple user role) such as profile management, password change, etc.
2	Publish and Manage B2B Service	Service provider, Service developer	Description: Publish a service in Service Directory and manage services in Service Directory.
3	Search and Display B2B Service	Service provider, Service developer	Description: Search a service in Service Directory and present service description.
4	Discovery and Use of App	End user	Description: This scenario evaluates the realization of end user interface to MOBiNET (such as the Parking app)

in the MOBiAGENT context.

Scenario 1: Create MOBiNET OpenID and Manage identity

Scenario 1 concentrates on evaluating if the identity model and functionality are sufficient for creating a MOBiNET OpenID and for managing own identity.

Scenario 2: Publish and Manage B2B Service

Scenario 2 evaluates the publishing tools provided by MOBiNET for publishing B2B services. It deals with the usability and intuitiveness of the service publishing tools as well as the coverage of the service description and metadata options available for the service description.

Scenario 3: Search and Display B2B Service

Scenario 3 evaluates the power and usability of the service discovery functionality offered by Dashboard by including searching of the just published service in various ways.

Scenario 4: Discovery and Use of App

Scenario 4 concentrates on the evaluation of the following end user topics:

- installation and configuring MOBiAGENT environment in the user terminal,
- creation of personalised MOBiNET end user account,
- app discovery

The topics above are tested in different terminal environments in order to test functioning and usability in various sizes of screens and operating system versions. In addition, app discovery using web interface is evaluated in different browser environments.

The scenarios above are thoroughly described in 0 (Appendix A: Validation scenarios used at Pilot site Trikala). In the following, we summarise the validation results and recommendations from the validation done for different releases.

For purposes of practicality, it is possible to think of and group the scenarios in even more general aspects; namely, **a) publishing services** (including scenarios 1, 2 and 3) and **b) end user experience** (including scenario 4 as well as scenario 1 to the extent of managing the user's own account and details).

Table 3 indicates which components were utilized specifically with the use cases, overall, with all platform releases.

Table 3. Components validated with the different use cases in the different releases at the Trikala pilot

Component	As a Use Case Designer (planning and defining how a use case uses MOBiNET)	As a Service Developer (e.g. programming with MOBiNET APIs)	As a Service Provider (e.g. publishing services)	As a User (e.g. finding and/or accessing content or services)
SD	X		X	
IdM	X	X	X	
Billing	X	X	X	
MOBiAGENT	X			X
TSP M				
DQA				
SDK	X		X	
Dashboard	X	X	X	X
Privacy Framework				

4.2. Results and recommendations after validation of release 1.0

With the first platform release (R1.1), the development focus was very heavily on providing technically feasible functionalities to realize specific service features. Specifically, meaning development tools for the first use cases. From a user point of view, this meant that using the platform had very little support for general use, and features such as logging in and using a graphical interface for searching for content were very cumbersome to use. While it was clear that the focus would be on enabling specific functionalities that enable operation, it meant that anyone other than devoted developers thoroughly following given guidelines would have very hard time using the platform. From an end user point of view, for example, searching for services would require using the exact ID of the service in order to find it. In the following Table an overview of the essential and optional improvements are listed based on the results of the Release 1 validation test cases in Trikala.

Table 4. R1.0 validation results for main features

Stakeholder	Type	Results	Test Case
Service provider	Essential	This case was not validated extensively due to lack of available web services for Trikala at this stage. However the service discovery	MP-23

		dashboard of the MOBiAGENT platform should add a dashboard targeting the automatic generation of dummy service request and response templates in order to enable rapid service integration	
	Essential	Some scaling issues when accessed on mobile devices. Perhaps a mobile friendly option can be introduced in the platform	MP-29
	Optional	Login to the dashboard is intuitive and easy. However it could be furthermore simplified by adopting a simple user ID and password pattern.	MP-54
	Essential	Multiple browsers were used during the validation with success.	MP-57
	Essential	Search of the service directory is simple. However the process should enable the use of various criteria such as service classification indicators, service creation data, description, etc.	MP-83
End user	Essential	The app store user interface lacks classification of apps according to the operational domain. Multiple sub-categories must be created on the basis of generic ITS domains and apps could be classified accordingly in order to ease "app surfing"	MP-41
	Essential	The use of many edit text boxes in the overall dashboard could be misleading, since in most interfaces a text box equals search functionality. The design must take this aspect into consideration in order to ensure that users provide search filters in the correct text box	MP-43
	Essential	Next releases should consider the creation of a Dashboard app that will simplify the usage of the dashboard.	MP-26
	Essential	Some scaling issues when accessed on mobile devices. Perhaps a mobile friendly option can be introduced in the platform	MP-29

Being the (expectedly crude) first implementation of the platform, providing recommendations is not considered relevant exactly. It was well-known that the backlog for upcoming functionalities and improvements is vast, and therefore the validation mainly related to using the core functionalities that were present and using the hands-on experience as a way to further refine and plan the service use cases, forming new requirements. In any case the set of recommendations provided after the validation of release 1.0 test cases is provided hereafter.

The dashboard's interface comprises many input text boxes. Even though the description of each field is clear, this aspect may mislead users from correctly using the platform. The UI design should consider minimizing the text boxes available and propose ones only when the user chooses to exploit certain functionality (such as service search, upload, etc.). More specifically, the functionality of the widgets that is provided is potentially very helpful for the end-user but during the validation of the widgets many problems occurred such as the inability of the widgets to dynamically adapt to the width according to modifications made to the page as well as the width and layout of the widget themselves (vertical and horizontal layout).

Moreover clustering of services and apps could be considered. Service providers and users will benefit from classification since it will ease service and app surfing by providing standardized ITS domain tags.

Simple tutorials and manuals should be available in order to speed up the dashboard's usage process. Moreover, it is considered that the possibility of online support via live chat or support links would encourage platform usage. Additionally the possibility of sample service request and response should be included in the case of the service dashboard; this additional feature would provide a quick and concrete understanding of the APIs to service users.

Furthermore, another more issue that was identified throughout the testing of the generic functionalities provided by the platform is the issue regarding the clarity and understanding that is conveyed to the user from the error messages that are presented to the user. In order to address this issue, the error messages together with suggestions for corrective actions could be presented to the user in order to notify him regarding an error that might have occurred but additionally assist him in overcoming this problem.

Finally the design must consider a more tabular approach in presenting the functionalities of service and/or application upload, search and description. Instead of presenting all functionalities in multiple windows that are viewable simultaneously, a multi pane layout could be adopted, where the user can initially select the function to be performed and then the system presents an additional pop-up view.

4.3. Results and recommendations after validation of release 2.0

This section provides a consolidated summary of the findings from validation of release 2.0. There has been remarkable advance and improvements from Release 1 and the previous validation. Most of the functionalities were available and the testers were able to carry out the tasks of validation.

The main problem even with the friendly testers was getting lost. Normally, when one gets lost, you tries to get back on the track. In the validation situation, it means searching help, guidance and documentation. The absence of the proper (on-line) help and documentation was the reason of the most errors. It was too easy to make mistakes.

The developer as a professional is expected to survive in the technical environment, and so s/he did. In Service Provider role there were many tasks where losing the way was too easy. End-user cannot yet survive within the end-user scenarios.

We validated altogether five scenarios: Identity Management, Publish B2B service, Publish App, Deploy and Use App and App and Service Implementation. In the following paragraphs we try to summarise the key findings scenario by scenario.

The specific additions for R2.0 (validated at Pilot site Trikala) are listed in Table 5.

Table 5. Requirements relevant for validation at Pilot site Trikala that were validated with R2.0 compared to R1.0

Scenario: Create MOBiNETMOBiNET OpenID and Manage identity		
Reference	Release	Requirement name
MP-54	1.0, 2.0	Login to Dashboard
Scenario: Publish and Manage B2B Service		
Reference	Release	Requirement name
MP-57	1.0, 2.0	Supported browsers
MP-84	2.0	Publish a Service to Service Directory
MP-85	2.0	Associate Metadata With a Published Service
MP-89	2.0	Define Service Coverage Area
MP-95	2.0	Extend Service Metadata Description for a Service
MP-96	2.0	Remove Service From Service Directory
Scenario: Publish and Manage B2B Service		
Reference	Release	Requirement name
MP-54	1.0, 2.0	Login to Dashboard
MP-57	1.0, 2.0	Supported browsers
MP-83	1.0, 2.0	Search Service Directory
MP-86	2.0	Define Service Technical Details
MP-89	2.0	Define Service Coverage Area
MP-97	2.0	Activate/Deactivate service
MP-595	2.0	Make widgets browser independent
Scenario: Discovery and Use of App		
Reference	Release	Requirement name
MP-29	1.0, 2.0	Mobile Device Screen Size
MP-41	1.0, 2.0	App Store UI
MP-43	1.0, 2.0	Search App Store

MP-420	2.0	Install MOBiAGENT from App Store
MP-605	2.0	Update AppDirectory UI
MP-610	2.0	Install MOBiAGENT extensions
MP-620	2.0	Add Google as external IDP to MOBiNET
MP-647	2.0	Service Discovery Widget
MP-652	2.0	MOBiAGENT end-user UI integration

In the following **Error! Reference source not found.** an overview of the essential and optional improvements are listed based on the results of the Release 2 validation test cases in Trikala.

Table 6 R2.0 validation results

Stakeholder	Type	Results	Test Case
Service provider	Essential	The look and feel of the login page is nice with clear meaning of text and large letters used. However the link to the identity manager (MOBiNET or Google) editing (e.g. for password change) functionality is missing.	MP-54, MP-57
	Optional	No major problems were encountered during the evaluation of the scenario, however the only way to publish a service is by providing an already prepared service description file (XML). It would be very nice to be able to publish a service by filling a form with the needed information and the service description file to be automatically generated. The drag and drop functionality are considered to be a good feature.	MP-84
	Essential	No major problems were encountered during the evaluation of the scenario, however it should be possible to be able to back up the service before deleting it (or provide an indication on this to the user). Moreover, there is no possibility to download the entire service description file in general. So if someone wants to delete a service file, should be able to take a back up copy before doing that.	MP-96
	Essential	A list of problems/difficulties were encountered during the validation of this	MP-84

	<p>scenario:</p> <ul style="list-style-type: none"> It was not straightforward how to validate this feature. The text that was shown (at the top of the message) in case of updating a service is “Upload new Service Description” which is the same as the one shown when uploading an entirely new service (that doesn’t exist at all). The only way to edit the description of a service is by updating the entire service description, which is problematic. <p>It would be nice if the service description fields could be edited (by changing the entries in the form fields). Currently the only way to publish a service is by providing an already prepared service description file (XML).</p>	
Essential	The problem encountered during the validation of this scenario was that the functionality of associating metadata with a published service could not be tested as the functionality was not found –or was not available, at the platform.	<i>MP-85</i>
Essential	The only way to define a service coverage area is by uploading the entire description of the service. It would be nice if the service coverage area could be defined or updated (for a published service) by filling in the corresponding fields of a form.	<i>MP-89</i>
Essential	The problem encountered during the validation of this scenario was that the functionality of extending metadata description could not be tested as the functionality was not found –or was not available, at the platform. The only possible action was to upload the entire description of a service.	<i>MP-95</i>
Essential	A list of problems/difficulties were encountered during the validation of this	<i>MP-83, MP-582, MP-590</i>

		<p>scenario:</p> <ul style="list-style-type: none"> • The search is case sensitive. • In the simple word search only the keywords are searched. No other fields can be searched in simple search option. For example if you put in the simple search the ID of an existing service, no results are returned. 	
	Essential	The scenario was tested with Firefox and Chrome. No problems encountered.	<i>MP-595</i>
End user	Essential	It was not possible to install the MOBiAGENT app on the smartphone used during the validation of this scenario as the MOBiAGENT app can be installed only in devices having Android version 2.2 up to 4.4. The MOBiAGENT app should be made compatible with Android 5.x. On the positive side, the possibility offered to install the app from Google play makes the installation procedure very easy.	<i>MP-420, MP-410</i>
	Essential	<p>In general the App Store offers a simple user interface. However the following difficulties were faced during the validation of the scenario:</p> <ul style="list-style-type: none"> • The first time the MOBiAGENT app was used (after installing it), the AppStore did not open automatically. In order to test the validation scenario the MOBiAGENT app was “force closed” and re-opened. Then, the AppStore UI opened automatically. • It was not possible to install any application The error “Installation of undeined failed” appears. 	<i>MP-41, MP-26, MP-29, MP-652</i>
	Essential	The Search App Store functionality is case sensitive – and it should be insensitive to the letter case used.	<i>MP-43, MP-605</i>
	Essential	The app deployment, usage and installation scenario could not be tested. The error	<i>MP-41</i>

		“Installation of undefined failed” appears. This should be fixed in the next platform version.	
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The recommendations provided after the validation of release 2.0 test cases is provided hereafter.

As an overall conclusion we can say that the platform offers some functionalities and features that can cover the basic functionalities that someone would expect.

A specific problem that was faced during the validation of this release was that in order to perform any modification of the description of a service the service developer should upload a new service description. This is because the platform in its current form does not allow modifying the description of the existing services. In order to solve the issue, the possibility to either upload a service description file or fill in an appropriate form should be provided. Therefore the main functionality that is currently missing and is considered important in our view is the service description editing.

Finally, the design of the platform has improved. The platform look and feel is nice and easy to use.

Regarding the Application directory, the overall impression is that it is easy to use – from an UI point of view, however the supported functionalities should be further worked out. More specifically, it is still not possible to install any application as an error “Installation of Undefined failed” appears. Moreover the search function is case sensitive and Android version 5.x should be supported.

Finally, it would be nice to offer a functionality that allows marking on a map (or similarly) an area, and to be able to search the apps that are applicable to this area. For example, if someone marks the area around Turin, only the applications that are applicable to Turin should appear.

4.4. Results and recommendations after validation of release 2.1 and 3.0

This section provides a consolidated summary of the findings from validation of releases 2.1 and 3.0. The results are merged together to provide a more holistic summary and to avoid repetition. The releases were commissioned and validated one after the other. It should be noted that validation of R3.0 was done very soon after R2.1 as the development cycles at the time were very fast in order to provide the platform users with more functionalities as they were prioritized and developed. Following a MOBiNET management decision the validation of release 2.1 validation scenarios was performed using release 3, which was available during the release 2.1 validation phase (due to the early production of platform release 3.0 for the needs of the hackathon that was performed in the context of the MOBiNET project). Therefore, comparing 2.1 to feedback given for 3.0 would not be feasible. The changes from R2.1 to R3.0, from the Pilot site Trikala perspective, were minimal and related to service description fields and how the search results in the graphical Service Directory interface work. The additional requirements for R2.1 and R3.0 (validated at Pilot site Trikala) are listed in the following Table.

Table 7. Requirements relevant for validation at Pilot site Trikala that were added for R2.1 and R3.0 compared to R2.0

Scenario: Create MOBiNETMOBiNET OpenID and Manage identity		
Reference	Release	Requirement name
MP-57	2.1	Supported Browsers
MP-79	2.1	Create New MOBiNET account
MP-613	2.1	Management of User Identities in MOBiNETIdP
MP-714	2.1	Widget management Interface
MP-818	3.0	Apply Style Guide to IDM UI
Scenario: Search and Display B2B Service		
Reference	Release	Requirement name
MP-51	3.0	Service Usage Statistics
MP-86	2.1	Define Service Technical Details
MP-87	2.1	Define Cost for Service Usage (if applicable)
MP-97	2.1	Activate/Deactivate service
MP-581	2.1	Service description should include owner and who registers this service
MP-584	2.1	Link service description to organization
MP-586	2.1	Associate USDL description with service description
MP-588	2.1	Extend widget functionalities
MP-595	2.1	Make widgets browser independent
MP-597	2.1	Language to be included in Service Description
MP-627	3.0	Widgets to display the analytics
MP-631	2.1	Extended Tutorials including a MOBiNET user manual of how to use components for service developers
MP-632	2.1	Improved Service Editor
MP-671	2.1	Customize Dashboard Login Page for MOBiNET
MP-706	2.1	Provide inline and context sensitive help
MP-710	3.0	Https for Dashboard
MP-712	2.1	Improve Analytics Server
MP-716	3.0	Add field "name" (searchable) to service description in addition to ID
MP-718	3.0	Add licences agreement description to service description

MP-740	3.0	Eclipse package should not be limited to 64bit operating system
MP-743	3.0	Overhaul Service Description Editor (Standalone Version)
MP-746	3.0	Privacy Manager instructions
MP-747	2.1	Editor: UI improvements: icons, tooltips
MP-748	2.1	Editor: Undo/redo operations
MP-749	2.1	Editor: adapt to the new (updated) service description format (work on-going)
MP-580	3.0	Graphic design for interfaces to ensure interfaces user friendly and attractive
MP-752	3.0	Editor: Online-Help
MP-753	3.0	Editor: Mandatory Fields
MP-754	3.0	Editor: Editor as separate eclipse executable (Windows 32-bit)
MP-756	3.0	Editor: update documentation for Editor
MP-793	3.0	Ensure that a developer only can manage/modify service descriptions from his own organization.
MP-792	3.0	Improve widget manager: Better management capabilities for the widgets
MP-817	3.0	Apply Style Guide to Dashboard and Widgets
Scenario: Publish and Manage B2B Service		
Reference	Release	Requirement name
MP-87	2.1	Define Cost for Service Usage
MP-580	3.0	Graphic design for interfaces to ensure interfaces user friendly and attractive
MP-581	2.1	Service description should include owner and who registers this service
MP-582	2.1	Search function
MP-584	2.1	Link service description to organization
MP-590	2.1	Search for services based on output data type/format
MP-597	2.1	Language to be included in Service Description
MP-671	2.1	Customize Dashboard Login Page for MOBiNET
MP-710	3.0	Https for Dashboard
MP-716	2.1	Add field "name" (searchable) to service description in addition to ID
MP-718	3.0	Add licences agreement description to service description
MP-720	2.1	Possibility to list all existing apps/services

MP-721	2.1	Improvements searching for services (state of the art)
MP-734	2.1	Possibility to list all existing services
MP-792	3.0	Improve widget manager: Better management capabilities for the widgets
MP-816	3.0	Update SD widgets
MP-817	3.0	Apply Style Guide to Dashboard an Widgets
Scenario: Discovery and Use of App		
Reference	Release	Requirement name
MP-79	2.1	Create New MOBiNET account
MP-783	3.0	Make MOBiAGENT compatible with Android version 5.x
MP-596	2.1	For all type of end user services
MP-783	3.0	Compatibility with Android 5
MP-790	3.0	Integrate Webviews into UI of MOBiAGENT (e.g. AppDirectory UI)
MP-791	3.0	Change start screen of MOBiAGENT to MOBiNET Login-Page

In the following Table an overview of the essential and optional improvements are listed based on the results of the Release 2.1 and 3.0 validation test cases in Trikala.

Table 8 Validation results R2.1 and R3.0

Stakeholder	Type	Results	Test Case
Service provider	Essential	<p>The UI theme is not consistent and seems outdated. The UI theme should be modified, so as to be the same comparing to the MOBiNET Dashboard. Moreover, the help functionality is missing and should be provided.</p> <p>It was also noticed that there is no possibility to record the list according to e.g. username. The list seems to appear according to date of creation. Finally, there is no filtering functionality, which should be added.</p>	MP-613
	Essential	<p>The Dashboard offers a nice look and feel and the main menu is very easy to use. Therefore we could say that login to dashboard is intuitive and easy. Some minor spelling error after putting credentials was</p>	<i>MP-54, MP-671, MP-57</i>

		<p>observed and should be fixed: "Allow tranfer" must be "Allow transfer".</p> <p>Especially for MP-714, there is no Admin link in the upper right corner (logged in as partyAdmin).</p>	
	Optional	<p>The following issues were faced during the validation of this scenario:</p> <p>a. When the service description is visualised (by pressing "Show Service Description", the text that is presented is missing si:serviceDescription tag. This is very confusing for someone that wants to copy the text, create a new service description file using this text and try to upload it to the service directory.</p> <p>b. If an error occurs (e.g the service description file is missing a mandatory field) , the message that appears doesn't assist the user in dealing with the error.</p> <p>The following suggestions are offered in order to overcome the issue:</p> <p>a. Either visualize the service description including si:serviceDescription tag or provide a hint that will guide the user that this tag must be added at the top and at the bottom.</p> <p>b. Provide to the user a more specific description about the errors that occur.</p> <p>Moreover we believe that the following functionalities/features are missing:</p> <p>a. Download service description as a file.</p> <p>b. Edit service description without having to upload a file again.</p> <p>In general, it offers a clean and easy to use interface and the drag and drop functionality is nice and should be maintained.</p>	MP-84
	Essential	<p>The following difficulties were encountered during the validation of the scenario:</p> <p>a. Display all services is not straight forward.</p>	MP-83, MP-721, MP-722, MP-717, MP-734, MP-706

	<p>I had to remove all text from the fields in order to see again all services.</p> <p>b. In "Simple Search" the search only takes the keywords of the service description. For example if I enter the service description ID no services appear.</p> <p>c. The search is case sensitive.</p> <p>Recommendations in order to overcome the above issues include the following:</p> <p>a. Provide a button "Display all services", which will clear all search fields and display all services.</p> <p>b. Add all the service description file information to the search.</p> <p>c. Make the search case insensitive.</p> <p>On the positive side, again the design of the search widget is "clean" and the drop down list at the advance search is very helpful.</p>	
<p>Essential</p>	<p>It is an easy to use functionality and no major issues were encountered during the validation of the scenario. Only a minor comment that might be helpful for the optimisation of the functionality: the text that appears when the mouse is over the trash bin must be "delete service" and not "delete service file".</p>	<p>MP-96</p>
<p>Essential</p>	<p>The following difficulties were encountered during the validation of this scenario:</p> <p>a. It seems that the service description file must have .xml extension in order to be uploaded. The file created by service description editor has .msd extension. I had to change the extension of the file in order to be able to upload it.</p> <p>b. MP-581: Include information on the service owner and who registered the service => If the user is not part of a business party the field "Owning Organization" in the "Details" of service presents a number (e.g. Owning</p>	<p>MP-84, MP-85, MP-86, MP-87, MP-89, MP-95, MP-580, MP-581, MP-584, MP-586, MP-588, MP-595, MP-597, MP-631, MP-632, MP-710, MP-716, MP-718, MP-740, MP-743, MP-746, MP-747, MP-748, MP-749, MP-750, MP-751, MP-752, MP-754, MP-816, MP-817</p>

		<p>Organization: 1442572486981[MOBiNET]) and not the text included in the uploaded description file.</p> <p>c. MP-716: Add field "name" (searchable) to service description in addition to ID => Not Working</p> <p>d.MP-748: Editor: Evaluate the undo/redo operations => Not working in standalone version.</p> <p>The following suggestions are provided so as to overcome the aforementioned issues:</p> <p>a. Either the service description file must create files with extension .xml or the dashboard must also accept .msd files.</p> <p>b. Present the information included in the uploaded file.</p> <p>Moreover, Chapter "6: Service Model / Service Description Format" from "D32.4.1 Service directory concept" (included in the support page under "Service Directory" must be a different document, easy to be found. This information (6 pages) is crucial to anyone that wants to create a service description file in order to publish a service into MOBiNET platform. To make someone search into a document of 100 pages to find these 6 pages is not very efficient.</p>	
	Optional/ Essential	The scenario was not validated as the functionality is not available.	<i>MP-97</i>
	Essential	<p>The following difficulties were encountered during the validation of this scenario:</p> <p>a. The help at the "Address" field in Advance Search doesn't make someone understand what is the expected input or the format of it.</p> <p>b. MP-590: Search for services based on output data type/format failed as the functionality is not supported</p>	<i>MP-83, MP-582, MP-590</i>
	Essential	The following difficulties were encountered	<i>MP-51, MP-712</i>

		during the validation of this scenario: - MP-712: Evaluate the improvements of the Analytics Server => Not working. I have logged using a plain user (that have uploaded a service) and the superuser (m0binet). The Analytics Server is a blank page in both cases.	
	Essential	The Dashboard offers a nice look and feel and the main menu is easy to use. Only a minor spelling error should be fixed, which appears after inserting the credentials. "Allow tranfer" must be "Allow transfer".	MP-54
	Essential	Everything worked fine.	MP-39, MP-38, MP-602, MP-618
	Essential	No issues to report.	MP-83, MP-582
	Optional	This scenario is not directly related to Trikala. No specific issues to report.	MP-32, MP-33
	Optional	This scenario is not directly related to Trikala. No specific issues to report.	MP-649, MP-648, MP-651, MP-650
End user	Essential	The installation of the MOBiAGENT worked fine. No issues to report.	MP-420, MP-610, MP-783
	Essential	It was possible to login to the MOBiAGENT only by using the MOBiNET IDP. It was not possible to login when the Google IDP was used.	MP-79, MP-620, MP-791
	Essential	The validation scenario was performed successfully; no issues to report.	MP-41, MP-790, MP-26, MP-29, MP-652
	Essential	The validation scenario was performed successfully; no issues to report.	MP-43, MP-596, MP-605, MP-647
	Essential	The following issues were encountered during the validation of this scenario, which should be fixed: - When trying to download UBI_app the link provided was not "clickable". - When trying to download parkAssist, which is stored in Google Play, a message appears	MP-41

		"The browser is not supported". The scenario was performed without leaving the MOBiAGENT (the MOBiAGENT bar was visible on the top).	
	Essential	It was not possible to install an application during the previous evaluation step; consequently it was not possible to manage any application.	MP-41

The design of the platform has further improved. The platform look and feel is nice and easy to use. Some of the recommendations provided during the previous evaluation step were taken into account, resulting in a more enhanced platform offering the user the expected functionalities.

Regarding the experience as service provider (B2B) it was concluded that the support centre needs to be updated further, with more information in order for someone to be able to use the MOBiNET platform without any assistance. Although the support centre has been substantially improved compared to the previous platform version, it is recommended to perform some further modifications. Namely, it is suggested to provide a video tutorial with step-by-step instructions that show how to use the platform. Also adequate documentation should be provided for every platform component. At the moment this is considered to be the main feature missing from the platform. It is of paramount importance to provide a user friendly help in the support centre: the user must be able to use the platform and its functionality without any technical help.

Regarding the end user experience (B2C), the MOBiAGENT offers the basic functionality that one expects; some further optimisation work is required in order to be able to download the relevant applications via the MOBiAGENT as reported in the results. A detailed list of issues and findings from the validation of R2.1 and R3.0 can be found as **Error! Reference source not found..**

4.5. Results and recommendations after validation of releases 3.1 and 4.0

In the following we summarize validation results from the perspective of the main tasks seen important in the Pilot Trikala. This section provides the validation results of releases 3.1 and 4.0. They are presented together to provide a consolidated view on the final stage of the developed functionalities. R4.0 focused on minor adjustments, and therefore the changes and additions compared to R3.1 did not present significant enough difference in order to report them separately. In other words, R4.0 validation, for the most part, confirmed the experiences and findings of R3.1. The validation scenarios used are outlined in 0. The additional requirements for R3.1 and R4.0 (validated at Pilot site Trikala) are listed in the following Table.

Table 9. Requirements relevant for validation at Pilot site Trikala that were added for R3.1 and R4.0 compared to R3.0

Scenario: Create MOBiNETMOBiNET OpenID and Manage identity		
Reference	Release	Requirement name
MP-714	3.1	Widget management interface

MP-793	3.1	Ensure that a developer only can manage/modify service descriptions from his own organization
MP-795	3.1	User interface for entity bank account attributes (e.g. IBAN) specific for the Billing component
MP-843	3.1	Apply the Roles and Rights model (in the Dashboard)
MP-853	3.1	Apply the Roles and Rights model (in the Service Directory)
MP-914	3.1	Evaluate the different SSC pages for Users
MP-915	3.1	Evaluate the Widget for "Terms of Service"
MP-916	3.1	Evaluate the Widget for "Contact"
MP-923	3.1	Evaluate the Single Sign On for Dashboard
MP-869	3.1	Login with Google account
MP-813	3.1	Verify whether Google users have threaten as each individual companies
MP-848	3.1	Try to change the role of a Google-user to a "developer user"
MP-894	3.1	Test Widget Identity Manager
MP-8.46	3.1	Evaluate whether MOBiNET Layout style is fully implemented
MP-8.18	3.1	Apply Style Guide to IDM UI
MP-823	3.1	Evaluate whether IDM is integrated into dashboard
MP-826	3.1	Evaluate the optimised behaviour of OpenID verification page
MP-847	3.1	Validate newly created users by confirming their email accounts
MP-849	3.1	Apply the Roles & Rights model; Manage platforms with accounts
MP-850	3.1	Apply the Roles & Rights model; Manage accounts for own party
MP-876	3.1	As a Business Party Administrator I need to be able to see other business party administrators
MP-950	4.0	Allow users to reset their password
MP-952	4.0	Improve user-friendliness of navigating between Identity Manager and Dashboard

Scenario: Search and Display B2B Service

Reference	Release	Requirement name
MP-92	3.1	Publish MOBiNET standard data format on MOBiNET
MP-580	3.1	Graphic design for interfaces to ensure interfaces user friendly and attractive
MP-589	3.1	Data catalogue of available data types

MP-593	3.1	Administrator of Service Directory is able to delete and de-active any services
MP-741	3.1	Update SDK Documentation
MP-745	3.1	Update Wrapper API for Service Directory
MP-799	3.1	Encoding of Service description file
MP-814	3.1	Update DataCatalog Widget
MP-816	3.1	Update SD Widget
MP-821	3.1	User authentication and authorization before deleting content in the Data Format Catalog
MP-852	3.1	Provide full Service Description file upon downloading from Dashboard
MP-857	3.1	Expand Server-Side validation of the uploaded service description
MP-858	3.1	Provide a more standardized approach to the data format
MP-871	3.1	Provide information on all fields (what is expected, examples).
MP-875	3.1	Check whether Mandatory fields of the Service Description are filled upon saving.
MP-882	3.1	Validate Map Coordinates
MP-883	3.1	Filter on the "input" and "output" fields from data catalog
MP-884	3.1	Client-side validation of uploaded service description (Client side, user experience validation)
MP-895	3.1	Import user details from Identity Manager
MP-896	3.1	Log events relevant for billing purposes
MP-897	3.1	Create a general framework for invoice generation
MP-898	3.1	Widget/User interface: search and visualization of invoices
MP-899	3.1	Widget/User interface of MOBiNET Administrator - search and visualization of invoices
MP-900	3.1	Generate SEPA file for bank direct debit
MP-901	3.1	Configuration of monthly MOBiNET subscription fee invoices
MP-902	3.1	Log B2B prepaid sales
MP-903	3.1	Generate B2B billing data for commissions
MP-920	3.1	Reformat UI for Data Format Catalog
MP-916	4.0	Widget for "Contact"
MP-929	4.0	A single User should not access to the IDM Authorization site from the Dashboard menu
MP-943	4.0	Hide unavailable functions from Dashboard menu

MP-944	4.0	Improve user-friendliness of Geographical area searching
MP-945	4.0	Improve user-friendliness of Dashboard menu choices
MP-948	4.0	Dashboard should support layout scaling
MP-949	4.0	Service Directory map view should open in Europe
MP-958	4.0	Add functionality to SDK specify language within Service Description
MP-959	4.0	Make the Service Description map coordinates functionality more robust
MP-970	4.0	Improve stability and reliability of Service Directory component
MP-973	4.0	Add and display contact detail fields of Service Description in Service Directory

Scenario: Publish and Manage B2B Service

Reference	Release	Requirement name
MP-706	3.1	Inline and context sensitive help
MP-717	3.1	Define a category based on predefined values
MP-722	3.1	Display geographical area on map
MP-824	3.1	Make searching in tags case independent
MP-842	3.1	Sort the services/item list within the Dashboard (SD-Widget) alphabetically
MP-859	3.1	Show the results from a search on map
MP-860	3.1	Searching for one of the categories/tags should return service description
MP-870	3.1	Improve the Simple Search functionality of the Dashboard widget
MP-872	3.1	Add a button to clear the search field for simple search functionality.

Scenario: Discovery and Use of App

Reference	Release	Requirement name
MP-38	3.1	Advertise applications via MOBiNET app store
MP-703	3.1	Distinguish between data, service and apps when describing and displaying them
MP-733	3.1	Local IDM stores user credentials after the first log-in
MP-878	3.1	Create MOBiNET account from the start screen
MP-861	3.1	Facilitate login to all MOBiNET platforms
MP-862	3.1	Be able to rotate the screen while using Service Directory UI
MP-864	3.1	Use native Android "back-button" within Service Directory UI
MP-867	3.1	Standard show only B2C Services in Service Directory UI

MP-868	3.1	Change default environments of Service Directory UI
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In the following Table an overview of the essential and optional improvements are listed based on the results of the Release 3.1 and 4.0 validation test cases in Trikala.

Table 10 Validation results R3.1 and R4.0

Stakeholder	Type	Results	Test Case
Service provider	Essential	<p>Overall the experience was positive. It is easy to create a new user both from start screen and as a business party admin.</p> <p>Encountered problems with the roles and rights model. I was able to use the analytics widget as Google user. Also I could access the data format search function as Google user, though it did not work, so that was correct but confusing.</p> <p>It is suggested to fix implementation of roles and rights model. If a user does not have access to something, give some information on why. A better solution is to remove inaccessible options for the specific user instead of just disable the functionality. Additionally, party admins should be able to add existing users to their party instead of first deleting the user and then create a New one from the party admin role.</p>	<p>MP-613 (MP-56)</p> <p>MP-894, MP-846, MP-818, MP-823, MP-826, MP-847, MP-849, MP-850, MP-876</p>
	Essential	<p>Google user login failed.</p> <p>Roles and rights model is not implemented correctly in the Dashboard. Google/end user can use the analytics option.</p>	<p>MP-54 (MP-57)</p> <p>MP-793, MP-843, MP-853, MP-869</p>
	Optional	<p>This scenario is not directly related to Trikala. No specific issues to report.</p>	<p>MP-895, MP-897, MP-898, MP-899, MP-900, MP-896, MP-901, MP-902, MP-903</p>
	Essential	<p>Mandatory Fields on organization has no function, the Fields will be filled with uploaders' organization upon uploading the SD. Adding metadata for an Application will not come out correctly in the produced xml-file. Both editor and server side validation fails to detect wrong metadata input in the</p>	<p>MP-84,MP-85, MP-86, MP-89, MP-92, MP-95, MP-580, MP-581, MP-584, MP-632, MP-716, MP-741, MP-753, MP-754, MP-799, MP-814, MP-857, MP-871, MP-875, MP-882, MP-883,</p>

		<p>xml-file. Experience in xml is needed to see this. Adding/Publishing a data format Works but after it has been uploaded it can not be deleted.</p> <p>It is suggested that it might be useful for the SD-editor to have a wizard that walks through the steps to create a Complete service description. Every step should also provide the information the user needs along the way.</p> <p>Overall, the SD-editor speeds up the process to create the Service description/xml. Once you understand how it works it is a useful tool, especially after I found out that hovering the mouse over the different options provided support information.</p>	<i>MP-884</i>
	Essential	Searching now functions as expected. It is also easy to use and understand.	<i>MP-83 MP-582, MP-590, MP-722, MP-820, MP-824, MP-842, MP-859, MP-860, MP-870, MP-872</i>
	Optional	The validation scenario was performed successfully; no issues to report.	<i>MP-51</i>
	Essential	Deleting content did not work. After content was uploaded it could not be removed.	<i>MP-96 MP-821</i>
End user	Essential	No specific problems encountered, installation of MOBiAGENT was straightforward. Clear messages during app installation which clarify what happens to the end user.	<i>MP-420 (MP-610, MP-783, MP-739, MP-866)</i>
	Essential	<p>Could not access MOBiAGENT with my credentials, start screen of MOBiAGENT didn't change to MOBiNET Login-Page</p> <p>Clarify the reason that access is denied in MOBiAGENT.</p>	<i>MP-79 (MP-791, MP-620) MP-733, MP-878, MP-861</i>
	Essential	Was able to rotate screen while in the log-in screen of MOBiAGENT.	<i>MP-41 (general view) (MP-790, MP-26, MP-29, MP-652) MP-862</i>
	Essential	The validation scenario was performed successfully; no issues to report.	<i>MP-43</i>

The design of the platform was further improved with R3.1. The platform look and feel is nice and easy to use. Some of the recommendations provided during the previous evaluation step were taken into account, resulting in a more enhanced platform offering the user the expected functionalities.

Regarding the experience as service provider (B2B) it was concluded that the support centre needs to be updated further, with more information in order for someone to be able to use the MOBiNET platform without any assistance. Although the support centre has been substantially improved compared to the previous platform version, it is recommended to perform some further modifications. In particular, it is suggested to provide a video tutorial with step-by-step instructions that show how to use the platform. Also adequate documentation should be provided for every platform component. At the moment this is considered to be the main feature missing from the platform. It is of paramount importance to provide a user friendly help in the support centre: the user must be able to use the platform and its functionality without any technical help.

Regarding the end user experience (B2C), the MOBiAGENT offers the basic functionality that one expects; some further optimisation work is required in order to be able to download the relevant applications via the MOBiAGENT as reported in the results.

The overall experience with the final platform release (R4.0) was positive. The SSC is very useful in informing the user on the way to use the platform and what has to be done in detail. The SSC overall clearly defined guidelines and instructions to perform tasks, however some additional improvements for the SSC were identified and were reported in detail in the previous section. It was identified that a service provider has the ability to publish services even in regions where (as a company) s/he has no presence. The MOBiNET platform overall provides the ability to utilize services provided by others in our region and therefore it enables us to provide added value to citizens/customers. The latter was identified as a major positive point on what the platform may bring to a service provider and is considered as one of its major positive aspects. The Trikala stakeholders would be willing to use a commercial version of the platform under the condition that the platform is tested for commercial use.

Regarding the platform quality, the Greek stakeholders provided the overall impressions for the MOBiNET platform as a whole (e.g. not detail level issues or user interface design choices for a specific platform release but the overall potential based on what has been developed during the project). The main purpose was to understand the overall quality of the platform as it is, the main requirements (or steps forward) for commercialization and the perceived potential as well as business opportunities and impacts.

Regarding interoperability, it was stated that it must be very easy for service providers and developers to offer their existing applications and services via MOBiNET. Thus, initial technical and business related barriers should be as low as possible. In this context, existing core systems of a service provider (e.g. existing identity management systems) should be usable without larger adaptations. For the Greek stakeholders it was possible to use MOBiNET IdM to validate the identity of Aalborg Parking service provider and allow the clients of it to use Trikala Parking services. In the same way it was possible to use the MOBiNET billing component to charge Aalborg Parking service provider for parking services provided by Trikala. Finally, it was possible for Trikala clients to locate parking places in both Trikala and Aalborg by using the same mobile application. The information related to the parking places of both cities were made available to the mobile application by querying the SD. However, the lack of integration of the IdM functionality into the billing component (no authentication/authorization procedures for using the billing) didn't allow us to use the component in real use cases, while some issues were faced with the

Google identity provider, as it did not work in MOBiAGENT. Although MOBiNET platform in its current form is not a commercial product, the Greek stakeholders identified some potential improvements towards achieving a commercial level platform. The main issue identified was the need for authentication/authorization procedures that need to be applied in the billing component.

Regarding performance it was stated that “The performance penalty added to existing services must be as low as possible. Particularly, the provided infrastructure services have to offer a good end-to-end performance and need to be able to scale in accordance to largely increasing number of clients” The discovery of the Trikala parking service was very fast. So the potential users of the service did not notice any delay in retrieving the related information. This was a very positive aspect, as it seems a prerequisite for the success of the service to have such quick responses. The client of Trikala parking services need to quickly find the relevant parking places information (including location, available parking slots, price etc.).

Regarding adaptability it was stated that “The platform must be extensible to new business models and new types of services which might not be supported at the moment. Otherwise, the platform might lose its attraction.” Indeed, the adaptability of the platform is applicable to the Trikala case, as the Trikala parking service is currently compatible with the ParkAssist application. In case another more popular application appears that can also discover services using the MOBiNET platform, it is possible for Trikala parking service provider to upload another service that will be compatible (in terms of data format and access API) with the new application. Although the existence of the data format section in MOBiNET is highly appreciated by the user (there is a section in the dashboard where supported data formats can be found), a user cannot find the related information about access API. Therefore, prior to platform commercialization, it may be crucial to provide all information required by a service developer in order to develop a service.

5. Summary and conclusions

5.1. Use cases and objectives

Pilot Trikala was involved in the realization of two use cases: *Multi Modal Travel Assistant (MMTA)*, and *Parking services* (Section 2.4). Their validation results collected during different phases of the project where shown in Chapter 4. This chapter summarizes the results.

The MMTA provides multimodal journey planning to end-users at different project pilot sites, by combining existing routing solutions. Pilot Trikala provided the contents for the Trikala pilot site (such as bus timetables, location of the bus stations and bus routes), via .xml files that contain the abovementioned information.

Parking services comprise of a B2B Parking data service and a B2C Parking service. The B2B Parking data service collects real-time parking information from a number of car parks and makes them available. The B2B Parking data service for Trikala is registered at the MOBiNET platform in order to offer the possibility to other services or applications to use the available parking data. The B2C Parking service (through the MOBiNET platform) uses the real-time parking data of Trikala as a B2B service. The Trikala B2C Parking service offers 4 different parking features to the end user including Route Guidance to nearest free parking bay, Automatic GPS based parking payment, Time-limited parking assistance and Find my parked car. Through the implementation and validation of this use case we show that the same B2C service can easily use data provided by different European city (given that the format used is compliant) and therefore this adds to the envisioned pan-European coverage, plus the fact that the local authorities can easily put the data in the MOBiNET service directory to reach a wide and broader community which opens up the possibilities for the provision of innovative solutions to citizens.

Table 11 Components and services used for validation at Pilot Trikala

	SD	IdM	Billing	MOBiAGENT	CM/CA	TSP M	SDK	Dashboard	DQA	Privacy Framework	Analytics
MMTA	X			X			X	X			
Parking	X						X	X			

5.2. Meeting the needs of the use cases

5.2.1. MMTA

The MMTA use case demonstrated and validated the use of MOBiNET from the perspective of service providers willing to offer their existing B2B services.

Conclusion: This use case supported the MOBiNET MMTA service by successfully publishing the descriptions of the public transport service APIs provided by the Trikala pilot site.

5.2.2. Parking services

The Parking services use case validated and demonstrated the use of MOBiNET in migrating the service to other regions. As a proof of the MOBiNET concept, car parks in Trikala in Greece is now integrated into the parking service from North Denmark. After setting up a data service from Trikala, it only required a limited amount of effort to extend the B2C Real Time Parking service from Denmark to Trikala and to let the system chose to use real time parking data from the Greek source when in Greece, to demonstrate the benefit of using MOBiNET in the implementation.

Conclusion: This case showed how to migrate an existing service to another area, with limited effort thanks to MOBiNET. By extending the initial release of the Parking Service with B2B functionality allowing the service to integrate parking services from more parking service providers at the same time, the end user gets access to a generic parking service that he can use, even when he is not in his own area or country.

5.3. Recommendations

Specific recommendations are listed at the end of R4 validation conclusions and recommendations in **Error! Reference source not found.**5, but the main recommendations from the Trikala pilot are the following:

- The MOBiNET platform should be complemented with additional functionality (utilizing 3rd parties where applicable) that bring new business opportunities (e.g., user tracking information realized in an acceptable way, API management integration with Service Directory and descriptions)
- Additional high-level programming libraries and integrated 3rd party services that make the creation of advanced mobility services easier should be added (i.e. more extensive developer tools).
- Attractive, full-featured user interface and functionality for end users should be designed and implemented in order to engage them to MOBiNET applications.
- Attractive and easy-to-use professional interfaces for service provider and developers through the Dashboard should be designed and implemented.
- Payment and clearing services applicable for all service and application providers.

5.4. Conclusions

While the number of reported validation issues, particularly with the early platform releases, was high, it is worth noting that a vast majority of the identified issues, recommendations and new requirements were mostly related to graphical user interfaces with far fewer issues related to the APIs of the platform. While the human interfaces are crucial for a commercial solution, that level of quality and technological readiness level was never expected during the project. The machine-to-machine interfaces and developer tools were the main focus and interest for the Trikala pilot. For those, the lack of good

documentation was the main gripe until the final releases, at which point the SDK and the Service Support Centre provided the needed help for practical developer use.

The realization of the two services (MMTA and Parking services) within Pilot site Trikala utilized MOBiNET successfully and in main parts as intended, and the main objectives (cf. 2.54) of the Trikala pilot were achieved. The main criteria for the services relate to technical interoperability and reliable connectivity with the platform. In these regards, the final platform release reached the necessary quality in supporting the use cases, enabling interoperability and seemingly stable status (whereas with the earlier platform releases downtime for different components was encountered).

As could be expected from the beginning, not all requirements and desires of all use cases are feasible to implement during a project. The main foreseen benefits in light of Pilot site Trikala experiments are realized through:

- service discovery for service aggregators
- service promotion through common market place by service providers
- support for forming service ecosystems as well as orchestrating and contextualizing the services aggregated from the players in the formed ecosystem

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Appendix A: Validation scenarios used at Pilot site Trikala

A1. Create MOBiNETMOBiNET OpenID and Manage identity

Validation Scenario ID	VS_TRI_CMID_SP_01-R4.0		
Name	Create MOBiNET OpenID and Manage identity		
Requirement Category	Identity manager		
Point of View (Stakeholder role)	Service provider		
Description	Create MOBiNET OpenID and manage identity (in simple user role) such as profile management, password change, etc.		
Objective	Evaluate if the identity model and functionality are sufficient for creating a MOBiNET OpenID and for managing own identity.		
Validation Pilot site	Trikala		
Requirements validated	Requirement ID	Release where validated	Requirement
	MP-54	1.0, 2.0, 2.1	Login to Dashboard
	MP-57	2.1	Supported Browsers
	MP-79	2.1	Create New MOBiNET account
	MP-613	2.1	Management of User Identities in MOBiNETIdP
	MP-714	2.1	Widget management Interface
	MP-818	3.0	Apply Style Guide to IDM UI
	MP-714	3.1	Widget management interface
	MP-793	3.1	Ensure that a developer only can manage/modify service descriptions from his own organization
MP-795	3.1	User interface for entity bank account attributes (e.g. IBAN) specific for the Billing component	

	MP-843	3.1	Apply the Roles and Rights model (in the Dashboard)
	MP-853	3.1	Apply the Roles and Rights model (in the Service Directory)
	MP-914	3.1	Evaluate the different SSC pages for Users
	MP-915	3.1	Evaluate the Widget for “Terms of Service”
	MP-916	3.1	Evaluate the Widget for “Contact”
	MP-923	3.1	Evaluate the Single Sign On for Dashboard
	MP-869	3.1	Login with Google account
	MP-813	3.1	Verify whether Google users have threaten as each individual companies
	MP-848	3.1	Try to change the role of a Google-user to a “developer user”
	MP-894	3.1	Test Widget Identity Manager
	MP-8.46	3.1	Evaluate whether MOBiNET Layout style is fully implemented
	MP-8.18	3.1	Apply Style Guide to IDM UI
	MP-823	3.1	Evaluate whether IDM is integrated into dashboard
	MP-826	3.1	Evaluate the optimised behaviour of OpenID verification page
	MP-847	3.1	Validate newly created users by confirming their email accounts
	MP-849	3.1	Apply the Roles & Rights model; Manage platforms with accounts
	MP-850	3.1	Apply the Roles & Rights model; Manage accounts for own party
	MP-876	3.1	As a Business Party Administrator I need to be able to see other business party administrators
	MP-950	4.0	Allow users to reset their password
	MP-952	4.0	Improve user-friendliness of navigating between Identity Manager and Dashboard

<p>Service(s) used in validation</p>	<p>The purpose of the validation scenario is generic (services are not required)</p>
<p>Process (validation steps)</p>	<ol style="list-style-type: none"> 1) MP-714: Widget management Interface <ul style="list-style-type: none"> • Access widget management interface 2) MP-79: Create New MOBiNET account <p>This step includes also MP-54: Login to Dashboard</p> <ul style="list-style-type: none"> • Create new MOBiNET account (sign up) • Login with new MOBiNET account (sign in) 3) MP-613: Management of User Identities in MOBiNETIdP <p>This step includes also MP-54: Login to the Dashboard</p> <ul style="list-style-type: none"> • Login with MOBiNET account into the MOBiNET dashboard and review the available functionalities, organisation, look and feel as well as intuitiveness. Include validation of the functionality related to the requirements below: <ul style="list-style-type: none"> - MP-714: Widget management interface - MP-793: Ensure that a developer only can manage/modify service descriptions from his own organization. - MP-795: User interface for entity bank account attributes (e.g. IBAN) specific for the Billing component - MP-843: Apply the Roles and Rights model (in the Dashboard) - MP-853: Apply the Roles and Rights model (in the Service Directory) - MP-914: Evaluate the different SSC pages for Users - MP-915: Evaluate the Widget for “Terms of Service” - MP-916: Evaluate the Widget for “Contact” - MP-923: Evaluate the Single Sign On for Dashboard - MP-869: Login with Google account - MP-813: Verify whether Google users have threaten as each individual companies - MP-848: Try to change the role of a Google-user to a “developer user” • Manage user identity (this step includes management of personal information & profile, password change, unregister and sign out) • Include validation of the functionality related to the requirements below: <ul style="list-style-type: none"> - MP-894: Test Widget Identity Manager - MP-8.46: Evaluate whether MOBiNET Layout style is fully implemented - MP-8.18: Apply Style Guide to IDM UI - MP-823: Evaluate whether IDM is integrated into dashboard - MP-826: Evaluate the optimised behaviour of OpenID

	<p>verification page</p> <ul style="list-style-type: none"> - MP-847: Validate newly created users by confirming their email accounts - MP-849: Apply the Roles & Rights model; Manage platforms with accounts - MP-850: Apply the Roles & Rights model; Manage accounts for own party - MP-876: As a Business Party Administrator I need to be able to see other business party administrators - MP-950: Allow users to reset their password - MP-952: Improve user-friendliness of navigating between Identity Manager and Dashboard <p>4) MP-714: Widget management Interface</p> <p>5) MP-57: Supported Browsers</p> <ul style="list-style-type: none"> • The above are repeated using different browsers
Notes	

A2 Publish and Manage B2B Service

Validation Scenario ID	VS_TRI_PMS_SP_01-R4.0
Name	Publish and Manage B2B Service
Requirement Category	Service directory, SDK
Point of View (Stakeholder role)	Service Provider, Service Developer
Description	<p>Publish a service in Service Directory and manage services in Service Directory.</p> <p>Following cases are evaluated within this scenario:</p> <ul style="list-style-type: none"> • Publish Trikala Parking service by service provider. • Delete Trikala Parking service by service provider. • Manage Trikala Parking service by service provider; management may include edit service description, extending service description metadata as well as the coverage of the service. • Pay for the subscription fee and evaluate the billing widgets
Objective	Evaluate the service publishing tools provided by MOBINET for the addition of B2B

	<p>services.</p> <p>This scenario evaluates the usability and intuitiveness of the service publishing tools as well as the coverage of the service and metadata options available for the service description. It also covers the validation of the billing functionalities.</p>		
Validation Pilot site	TRI		
Requirements validated	Requirement ID	Release where validated	Requirement
	MP-51	3.0	Service Usage Statistics
	MP-54	1.0, 2.0, 2.1	Login to Dashboard
	MP-57	1.0, 2.0, 2.1	Supported browsers
	MP-84	2.0, 2.1	Publish a Service to Service Directory
	MP-85	2.0, 2.1	Associate Metadata With a Published Service
	MP-86	2.1	Define Service Technical Details
	MP-87	2.1	Define Cost for Service Usage (if applicable)
	MP-89	2.0, 2.1	Define Service Coverage Area
	MP-92	3.1	Publish MOBiNET standard data format on MOBiNET
	MP-95	2.0, 2.1	Extend Service Metadata Description for a Service
	MP-96	2.0, 2.1	Remove Service From Service Directory
	MP-97	2.1	Activate/Deactivate service
	MP-580	3.1	Graphic design for interfaces to ensure interfaces user friendly and attractive
	MP-581	2.1	Service description should include owner and who registers this service
	MP-584	2.1	Link service description to organization
	MP-586	2.1	Associate USDL description with service description
MP-588	2.1	Extend widget functionalities	

MP-589	3.1	Data catalogue of available data types
MP-593	3.1	Administrator of Service Directory is able to delete and de-active any services
MP-595	2.1	Make widgets browser independent
MP-597	2.1	Language to be included in Service Description
MP-627	3.0	Widgets to display the analytics
MP-631	2.1	Extended Tutorials including a MOBiNET user manual of how to use components for service developers
MP-632	2.1	Improved Service Editor
MP-671	2.1	Customize Dashboard Login Page for MOBiNET
MP-706	2.1	Provide inline and context sensitive help
MP-710	3.0	Https for Dashboard
MP-712	2.1	Improve Analytics Server
MP-716	3.0	Add field "name" (searchable) to service description in addition to ID
MP-717	2.1	It should be possible to define a category based on pre-defined values
MP-718	3.0	Add licences agreement description to service description
MP-740	3.0	Eclipse package should not be limited to 64bit operating system
MP-741	3.1	Update SDK Documentation
MP-743	3.0	Overhaul Service Description Editor (Standalone Version)
MP-745	3.1	Update Wrapper API for Service Directory
MP-746	3.0	Privacy Manager instructions
MP-747	2.1	Editor: UI improvements: icons, tooltips
MP-748	2.1	Editor: Undo/redo operations
MP-749	2.1	Editor: adapt to the new (updated) service

		description format (work on-going)
MP-580	3.0	Graphic design for interfaces to ensure interfaces user friendly and attractive
MP-752	3.0	Editor: Online-Help
MP-753	3.0	Editor: Mandatory Fields
MP-754	3.0	Editor: Editor as separate eclipse executable (Windows 32-bit)
MP-756	3.0	Editor: update documentation for Editor
MP-793	3.0	Ensure that a developer only can manage/modify service descriptions from his own organization.
MP-792	3.0	Improve widget manager: Better management capabilities for the widgets
MP-799	3.1	Encoding of Service description file
MP-814	3.1	Update DataCatalog Widget
MP-816	3.1	Update SD Widget
MP-817	3.0	Apply Style Guide to Dashboard and Widgets
MP-821	3.1	User authentication and authorization before deleting content in the Data Format Catalog
MP-852	3.1	Provide full Service Description file upon downloading from Dashboard
MP-857	3.1	Expand Server-Side validation of the uploaded service description
MP-858	3.1	Provide a more standardized approach to the data format
MP-871	3.1	Provide information on all fields (what is expected, examples).
MP-875	3.1	Check whether Mandatory fields of the Service Description are filled upon saving.
MP-882	3.1	Validate Map Coordinates
MP-883	3.1	Filter on the "input" and "output" fields from data catalog

MP-884	3.1	Client-side validation of uploaded service description (Client side, user experience validation)
MP-895	3.1	Import user details from Identity Manager
MP-896	3.1	Log events relevant for billing purposes
MP-897	3.1	Create a general framework for invoice generation
MP-898	3.1	Widget/User interface: search and visualization of invoices
MP-899	3.1	Widget/User interface of MOBiNET Administrator - search and visualization of invoices
MP-900	3.1	Generate SEPA file for bank direct debit
MP-901	3.1	Configuration of monthly MOBiNET subscription fee invoices
MP-902	3.1	Log B2B prepaid sales
MP-903	3.1	Generate B2B billing data for commissions
MP-920	3.1	Reformat UI for Data Format Catalog
MP-916	4.0	Widget for "Contact"
MP-929	4.0	A single User should not access to the IDM Authorization site from the Dashboard menu
MP-943	4.0	Hide unavailable functions from Dashboard menu
MP-944	4.0	Improve user-friendliness of Geographical area searching
MP-945	4.0	Improve user-friendliness of Dashboard menu choices
MP-948	4.0	Dashboard should support layout scaling
MP-949	4.0	Service Directory map view should open in Europe
MP-958	4.0	Add functionality to SDK specify language within Service Description
MP-959	4.0	Make the Service Description map coordinates

			functionality more robust
	MP-970	4.0	Improve stability and reliability of Service Directory component
	MP-973	4.0	Add and display contact detail fields of Service Description in Service Directory
Service(s) used in validation	Trikala Parking Service		
Process (validation steps)	<p>1) Create the Trikala Parking Service using the Service Editor</p> <ul style="list-style-type: none"> • Include validation of the functionality related to the requirements below: <ul style="list-style-type: none"> - MP-85: Associate Metadata With a Published Service - MP-92: Publish MOBiNET standard data format on MOBiNET - MP-95: Extend Service Metadata Description for a Service - MP-580: Graphic design for interfaces to ensure interfaces user friendly and attractive - MP-586: Associate USDL description with service description - MP-588: Extend widget functionalities - MP-589: Data catalogue of available data types - MP-593: Administrator of Service Directory is able to delete and de-active any services - MP-743: Overhaul Service Description Editor (Standalone Version) - MP-747: Editor: UI improvements: icons, tooltips - MP-748: Editor: Undo/redo operations - MP-749: Editor: adapt to the new (updated) service description format (work on-going) - MP-632: Improved Service Editor - MP-717: It should be possible to define a category based on pre-defined values - MP-588: Extended widget functionalities - MP-595: Make widgets browser independent - MP-916: Widget for "Contact" - MP-929: A single User should not access to the IDM Authorization site from the Dashboard menu - MP-943: Hide unavailable functions from Dashboard menu - MP-944: Improve user-friendliness of Geographical area searching - MP-945: Improve user-friendliness of Dashboard menu choices - MP-948: Dashboard should support layout scaling - MP-949: Service Directory map view should open in Europe 		

- MP-958: Add functionality to SDK specify language within Service Description
- MP-959: Make the Service Description map coordinates functionality more robust
- MP-970: Improve stability and reliability of Service Directory component
- MP-973: Add and display contact detail fields of Service Description in Service Directory
- Include validation that the editor offers the functionality related to the requirements below:
 - MP-86: Define Service Technical Details
 - MP-87: Define Cost for Service Usage
 - MP-89: Define Service Coverage Area
 - MP-581: Service description should include owner and who registers this service
 - MP-584: Link service description to organization
 - MP597: Language to be included in Service Description
 - MP-716: Add field "name" (searchable) to service description in addition to ID
 - MP-718: Add licences agreement description to service description
 - MP-740: Eclipse package should not be limited to 64bit operating system
 - MP-745: Update Wrapper API for Service Directory
 - MP-753: Editor: Mandatory Fields
 - MP-754: Editor: Editor as separate eclipse executable (Windows 32-bit)
- 2) Publish the Trikala Parking Service
 - Include validation of the functionality related to the requirements below:
 - MP-84: Publish a Service to Service Directory
 - MP-54: Login to Dashboard (*both with MOBiNET and Google OpenID*)
 - MP-57: Supported browsers
 - MP-671: Customize Dashboard Login Page for MOBiNET
 - MP-706: Provide inline and context sensitive help
 - MP-710: Https for Dashboard
 - MP-580: Graphic design for interfaces to ensure interfaces user friendly and attractive
 - MP-792: Improve widget manager: Better management capabilities for the widgets
 - MP-817: Apply Style Guide to Dashboard an Widgets
- 3) Manage Service (Activate/Deactivate Service& Usage Statistics)
 - Include validation of the functionality related to the requirements

below:

- MP-51: Service Usage Statistics
- MP-97: Activate/Deactivate service
- MP-54: Login to Dashboard (both with MOBiNET and Google OpenID)
- MP-627: Widgets to display the analytics
- MP-793: Ensure that a developer only can manage/modify service descriptions from his own organization.

4) Remove Service from Service Directory

- Include validation of the functionality related to the requirements below:
 - MP-96: Remove Service From Service Directory
 - MP-821: User authentication and authorization before deleting content in the Data Format Catalog
 - MP-54: Login to Dashboard (*both with MOBiNET and Google OpenID*)

5) Support and Documentation

- MP-631: Extended Tutorials including a MOBiNET user manual of how to use components for service developers
- MP-706: Provide inline and context sensitive help
- MP-712: Improve Analytics Server
- MP-741: Update SDK Documentation
- MP-746: Privacy Manager instructions
- MP-756: Editor: update documentation for Editor
- MP-752: Editor: Online-Help

6) Pay for the subscription fee and evaluate the billing widgets

- Include validation of the functionality related to the requirements below:
 - MP-895: Import user details from Identity Manager
 - MP-896: Log events relevant for billing purposes
 - MP-897: Create a general framework for invoice generation
 - MP-898: Widget/User interface: search and visualization of invoices
 - MP-899: Widget/User interface of MOBiNET Administrator – search and visualization of invoices
 - MP-900: Generate SEPA file for bank direct debit
 - MP-901: Configuration of monthly MOBiNET subscription fee invoices
 - MP-902: Log B2B prepaid sales
 - MP-903: Generate B2B billing data for commissions

Notes

A3 Search and Display B2B Service

Validation Scenario ID	VS_TRI_SDS_SP_01-R4.0		
Name	Search and Display B2B Service		
Requirement Category	Service directory, SDK		
Point of View (Stakeholder role)	Service Provider, Service Developer		
Description	Search a service in Service Directory and present service description.		
Objective	This scenario evaluates the power and usability of the service discovery functionality offered by dashboard by including searching of the just published service in various ways.		
Validation Pilot site	TRI		
Requirements validated	Requirement ID	Release where validated	Requirement
	ID	R	Name
	MP-54	1.0, 2.0, 2.1	Login to Dashboard
	MP-57	1.0, 2.0, 2.1	Supported browsers
	MP-83	1.0, 2.0, 2.1	Search Service Directory
	MP-86	2.0, 2.1	Define Service Technical Details
	MP-87	2.1	Define Cost for Service Usage
	MP-89	2.0, 2.1	Define Service Coverage Area
	MP-97	2.0, 2.1	Activate/Deactivate service
	MP-580	3.0	Graphic design for interfaces to ensure interfaces user friendly and attractive
	MP-581	2.1	Service description should include owner and who registers this service
	MP-582	2.1	Search function
	MP-584	2.1	Link service description to organization

MP-590	2.1	Search for services based on output data type/format
MP-595	2.0, 2.1	Make widgets browser independent
MP-597	2.1	Language to be included in Service Description
MP-671	2.1	Customize Dashboard Login Page for MOBiNET
MP-706	3.1	Inline and context sensitive help
MP-710	3.0	Https for Dashboard
MP-716	2.1	Add field "name" (searchable) to service description in addition to ID
MP-717	3.1	Define a category based on predefined values
MP-718	3.0	Add licences agreement description to service description
MP-720	2.1	Possibility to list all existing apps/services
MP-721	2.1	Improvements searching for services (state of the art)
MP-722	3.1	Display geographical area on map
MP-734	2.1	Possibility to list all existing services
MP-792	3.0	Improve widget manager: Better management capabilities for the widgets
MP-816	3.0	Update SD widgets
MP-817	3.0	Apply Style Guide to Dashboard an Widgets
MP-824	3.1	Make searching in tags case independent
MP-842	3.1	Sort the services/item list within the Dashboard (SD-Widget) alphabetically
MP-859	3.1	Show the results from a search on map
MP-860	3.1	Searching for one of the categories/tags should return service description
MP-870	3.1	Improve the Simple Search functionality of the Dashboard widget
MP-872	3.1	Add a button to clear the search field for simple

	search functionality.
Service(s) used in validation	Trikala Parking Service (and other services published in the MOBINET Service Directory)
Process (validation steps)	<ol style="list-style-type: none"> 1) Search Service Directory <ol style="list-style-type: none"> a. Search for the Trikala Parking service published during the previous validation scenario (VS_TRI_PMS_SP_01-R3.0) using both the simple and advanced search options. b. Search with all possible ways to test richness of the search functionality c. Search published service both after activation of the service and after de-activation of the service <ul style="list-style-type: none"> • Include validation of the functionality related to the requirements below: <ul style="list-style-type: none"> - MP-83: Search Service Directory - MP-54: Login to Dashboard (<i>both with MOBINET and Google OpenID</i>) - MP-57: Supported browsers - MP-671: Customize Dashboard Login Page for MOBINET - MP-582: Search function - MP-590: Search for services based on output data type/format - MP-97: Activate/Deactivate service - MP-580: Graphic design for interfaces to ensure interfaces user friendly and attractive - MP-595: Make widgets browser independent - MP-706: Inline and context sensitive help - MP-710: Https for Dashboard - MP-717: Define a category based on predefined values - MP-720: list all services - MP-721: Improvements searching for services (state of the art) - MP-722: Display geographical area on map - MP-734: Possibility to list all existing services - MP-792: Improve widget manager: Better management capabilities for the widgets - MP-816: Update SD widgets - MP-817: Apply Style Guide to Dashboard an Widgets - MP-824: Make searching in tags case independent - MP-842: Sort the services/item list within the Dashboard (SD-Widget) alphabetically - MP-859: Show the results from a search on map - MP-860: Searching for one of the categories/tags should

	<p>return service description</p> <ul style="list-style-type: none"> - MP-870: Improve the Simple Search functionality of the Dashboard widget - MP-872: Add a button to clear the search field for simple search functionality <p>2) View Service Description</p> <ul style="list-style-type: none"> • This step ensures that the detailed description of a service published in MOBiNET platform can be viewed. • Include validation that the service description incorporates the information related to the requirements below: <ul style="list-style-type: none"> - MP-86: Define Service Technical Details - MP-87: Define Cost for Service Usage - MP-89: Define Service Coverage Area - MP-581: Service description should include owner and who registers this service - MP-584: Link service description to organization - MP597: Language to be included in Service Description - MP-716: Add field “name” (searchable) to service description in addition to ID - MP-718: Add licences agreement description to service description - MP-722: Display geographical area on map when showing details of Service Description
Notes	

A4 Discovery and Use of App

Validation Scenario ID	VS_TRI_DUA_EU_01-R4.0
Name	Discovery and Use of App
Requirement Category	App discovery and use
Point of View (Stakeholder role)	End user
Description	This scenario evaluates the realization of end user interface to MOBiNET (such as the Parking app) in the MOBiAGENT context.
Objective	<p>The evaluation concentrates on the following end user topics:</p> <ul style="list-style-type: none"> • installation and configuring MOBiAGENT environment in the user terminal,

- creation of personalised MOBiNET end user account,
- app discovery

The topics above are tested in different terminal environments in order to test functioning and usability in various sizes of screens and operating system versions. In addition, app discovery using web interface is evaluated in different browser environments.

Validation Pilot site TRI

Requirements validated	Requirement ID	Release where validated	Requirement
	ID	R	Name
	MP-29	1.0, 2.0, 2.1	Mobile Device Screen Size
	MP-38	3.1	Advertise applications via MOBiNET app store
	MP-41	1.0, 2.0, 2.1	App Store UI
	MP-43	1.0, 2.0, 2.1	Search App Store
	MP-79	2.1	Create New MOBiNET account
	MP-420	2.0, 2.1	Install MOBiAGENT from App Store
	MP-783	3.0	Make MOBiAGENT compatible with Android version 5.x
	MP-596	2.1	For all type of end user services
	MP-605	2.0, 2.1	Update AppDirectory UI
	MP-610	2.0, 2.1	Install MOBiAGENT extensions
	MP-620	2.0, 2.1	Add Google as external IDP to MOBiNET
	MP-647	2.0, 2.1	Service Discovery Widget
	MP-652	2.0, 2.1	MOBiAGENT end-user UI integration
	MP-703	3.1	Distinguish between data, service and apps when describing and displaying them
	MP-733	3.1	Local IDM stores user credentials after the first log-in
	MP-783	3.0	Compatibility with Android 5

	MP-790	3.0	Integrate Webviews into UI of MOBiAGENT (e.g. AppDirectory UI)
	MP-791	3.0	Change start screen of MOBiAGENT to MOBiNET Login-Page
	MP-878	3.1	Create MOBiNET account from the start screen
	MP-861	3.1	Facilitate login to all MOBiNET platforms
	MP-862	3.1	Be able to rotate the screen while using Service Directory UI
	MP-864	3.1	Use native Android “back-button” within Service Directory UI
	MP-867	3.1	Standard show only B2C Services in Service Directory UI
	MP-868	3.1	Change default environments of Service Directory UI
Service(s) used in validation	Validation of discovery of Parking app		
Process (validation steps)	<ol style="list-style-type: none"> 1) Installation of MOBiAGENT on android device <ul style="list-style-type: none"> • Download and install MOBiAGENT and required extensions via Google Play Beta program:https://play.google.com/apps/testing/org.MOBiNET.mobiagent • Include validation of the functionality related to the requirements below: <ul style="list-style-type: none"> - MP-420: Install MOBiAGENT from app store - MP-26: Android Operating System - MP-783: Compatibility with Android 5 - MP-610: Install MOBiAGENT extensions (if required) 2) Log into MOBiNET as end user <ul style="list-style-type: none"> • Include validation of the functionality related to the requirements below: <ul style="list-style-type: none"> - MP-79: Create New MOBiNET Account (<i>if necessary</i>) - MP-878: Create MOBiNET account from the start screen - MP-620: Add Google as external IDP to MOBiNET (as background information) - MP-733: Local IDM stores user credentials after the first login - MP-791: Change start screen of MOBiAGENT to MOBiNET Login-Page - MP-861: Facilitate login to all MOBiNET platforms 3) Experiment end user interface offered by MOBiAGENT using different end 		

user terminal environments

- Include validation of the functionality related to the requirements below:
 - MP-41: App Store UI (general view)
 - MP-790: Integrate Webviews into UI of MOBiAGENT (e.g. AppDirectory UI)
 - MP-26: Android Operating System
 - MP-29: Mobile Screen Size
 - MP-652: MOBiAGENT end-user UI integration
 - MP-862: Be able to rotate the screen while using Service Directory UI
 - MP-864: Use native Android “back-button” within Service Directory UI
 - MP-868: Change default environments of Service Directory UI

4) Search Apps Store and App Retrieval

- By using MOBiAGENT end user UI, search applications in various ways in order to find out what apps are available. Specifically search Parking app. Check how different kinds of end user apps and services are found and how their service descriptions are presented.
- Once the desired end user app is found test how it can be retrieved.
- Include validation of the functionality related to the requirements below:
 - MP-38: Advertise applications via MOBiNET app store
 - MP-43: Search Apps Store
 - MP-596: For all type of end user services
 - MP-605: Update AppDirectory UI
 - MP-647: Service Discovery Widget
 - MP-703: Distinguish between data, service and apps when describing and displaying them
 - MP-41: App Store UI
 - MP-867: Standard show only B2C Services in Service Directory UI

5) Evaluate MOBiNET environment from end-user perspective

- Does MOBiAGENT bring added value for end user application discovery, deployment and use?
- Evaluate acceptance (usefulness, friendliness, etc.)
- Uninstall the MOBiNET application (and see implications)

Notes