D21.2.1

2.2a Final MOBiNET Requirements

(release 1)

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Version	**Date**	**Main author**	**Summary of changes**
1.0	01/05/2014	Yanying Li (ERTICO)	Collecting user requirements
1.1	13/03/2014	Guillem Bernatallada (ACASA) Igor Passchier (TNO) Zeljko Jeftic (IRU Projects) Juho Kostiainen (VTT)	Requirements from Service providers' point view
2.0	30/06/2014	Yanying Li (ERTICO)	Finalising user requirements based on collected user requirements and discussions from workshop

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Abbreviations and Definitions

Abbreviation or term	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)
Application	A computer program or group of programs designed for end users to perform tasks in order to achieve their goals
API	Application programming interface
B2B	Business-to-business
B2C	Business-to-consumer
Candidate scenario	A scenario (description) that could be realized as a service using the MOBiNET platform. Candidate scenarios are suitable to describe a service, e.g. new innovative service ideas that do not yet exist as concrete services or well-defined concepts
Candidate service	A description of the possible (new or existing) MOBiNET service. A candidate service (description) is suitable to describe existing services as well as well-defined service concepts
CA	Communication Agent
CM	Communication Manager
End user	Human agent using the application and/or service.
FCD	Floating Car Data
FVD	Floating Vehicle Data.
G5	European Standard for ITS operating in the 5 GHz frequency band.
GPRS	General packet radio service that is a packet oriented mobile data service on the 2G and 3G cellular communication system's global system for mobile communications (GSM)
HTTP	Hypertext Transfer Protocol. An application protocol for distributed, collaborative, hypermedia information systems. HTTP is the foundation of data communication for the World Wide Web

HTTPS	Hypertext Transfer Protocol Secure. A communications protocol for secure communication over a computer network, with especially wide deployment on the Internet
Initial use case	A use case used to extract preliminary functional and non-functional requirements for the MOBiNET platform in its early phases of the development. An initial use case does not have to be implemented at a pilot site
MOBiNET service	Any service realised, provided and used in the context of MOBiNET system
OSGi	Vehicle ITS Station (On-Board Unit)
Service	Activity or combination of activities carried out by a service provider interactively with a customer to fulfil a need of the latter
SDK	Service Development Kit
Service provider	Entity providing services to others
Service user	Entity consuming a service
Use case	The specification of sequences of actions, including variant sequences and error sequences, that a system, subsystem, or class can perform by interacting with outside objects to provide a service of value. (Rumbaugh+ 2005)
UI	User Interface

Executive Summary

The MOBiNET platform is planned to have three Releases. Release 1 has been developed based on requirements collected in the first stage and three use cases. This document serves as input for development of the Platform Release 2.

The requirement study has been based on the current functionalities of Release 1, services planned to use Release 2 and service providers' expectations for Release 2. Requirement gathering with continue in the next two months when users can have more experiences with the platform Release 1. All requirements will be reviewed by the development team in order to prioritise them. The Integration team of the project will decide what requirements to be transferred into functionalities of Release 2.

The functional requirements for the eight components of the MOBiNET platform, i.e. Service Directory, App Directory, Communication Agent, MOBiAgent, Identify Manager, Dashboard, Service Development Kit (SDK) and Payment Management (Billing), are described. Except for Payment Management (billing), requirements for each components are only for additional functionalities for Release 2. Since Payment Management is not yet available in Release 1, all requirements for this component are presented in this report. For service Directory, a new requirement of provision of use statistics is proposed. However, the use statistics will be provided through a function of Dashboard. Service Directory should also provide search functions based on different criteria. For App Directory, a new requirement is to allow users to give comments, rank (or rate) an app and other users will be able to see them. App directory should make the description format more dedicated towards apps, i.e. include icon, description, platform availability, etc. MOBiAgent should be able to provide a function to allow an App Developer to publish alerts to End User, based on the current MOBiNET context even if the application is running in the background, so that user can be informed about any urgent or important information gathered from the service.

Non-functional requirements cover accessibility and availability, security, privacy, expandability and performance. It has been identified that security and availability must be guaranteed by design.

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1. Introduction

1.1. Purpose and scope of this document

Development of the MOBiNET platform follows the Agile approach as shown in Figure 1. Agile software development method is mainly targeted at a complex system which is difficult to predict all requirements. Agile approach allows a more evolutional process during a software development cycle. Instead of all detailed requirements, Agile development will be more adoptive to new requirements. In MOBiNET, there are three releases of the MOBiNET platform. There are three releases of the platform:

- Release 1: available at 01/05/2014 for Helmond pilot site for verification; available at 01/07/2014 for all the service providers and pilot sites;
- Release 2: available at 01/03/2015 for Helmond pilot site for verification; available at 01/05/2015 for all the service providers and pilot sites;
- Release 3: available at 01/01/2016 for Helmond pilot site for verification; available at 01/03/2016 for all the service providers and pilot sites;

The Release 1 has been developed based on preliminary user requirements and three initial use cases. After Release 1 is ready, users can review the functionalities and provide additional requirements on new functionalities or improvements for existing functionalities. Developers are also able to check if their software meet users' requirements and provide inputs to requirements for next Release. Currently Release 1 of the platform has been developed and tested with three use cases. From beginning of this year, collecting requirements for Release 2 of the platform was initiated, aiming at providing inputs for the next stage of the development.

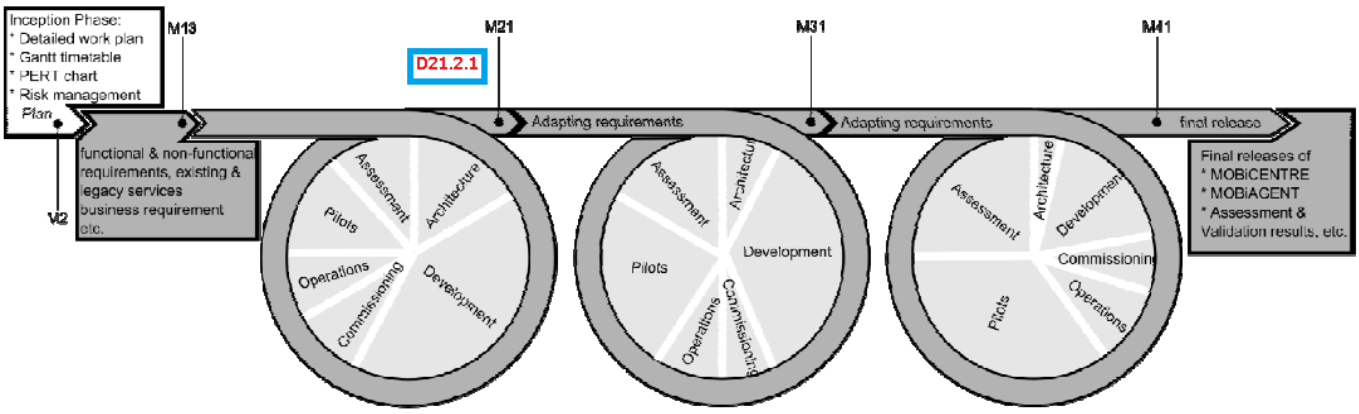

Figure 1 MOBINET development cycle and position of this deliverable

This deliverable therefore serves as an interim report between the two releases of the platform before M21 (see Figure 1). This deliverable summarises current results on requirement study. The requirement study for Release 2 will continue till September when the Release 2 development officially starts. All collected requirements presented in this deliverable will be reviewed by the development team. Due to limited resources and time, it may not be possible to meet all requirements. Therefore, all requirements

will be prioritised and the Integration Team (IP-IT) of the project will decide which requirements to be transferred to functionalities of Release 2.

1.2. Methodology

Gathering requirements for Release 2 took three steps:

- Users to review existing functionalities of Release 1;
- Users to give their expectations and their expectations will be mapped with the existing functionalities, thus identifying new requirements for Release 2, (either as a new function or a improvement for existing function);
- Additional requirements specifically for services to be implemented in Release 2.

All collected requirements will be stored in JAMA, a requirement management tool (as shown in Figure 2). All requirements will be reviewed by the IP-IT. Reviewed and approved requirements will be transferred into a function description and automatically exported into JIRA, a software task development tool, and assigned to a software developer.

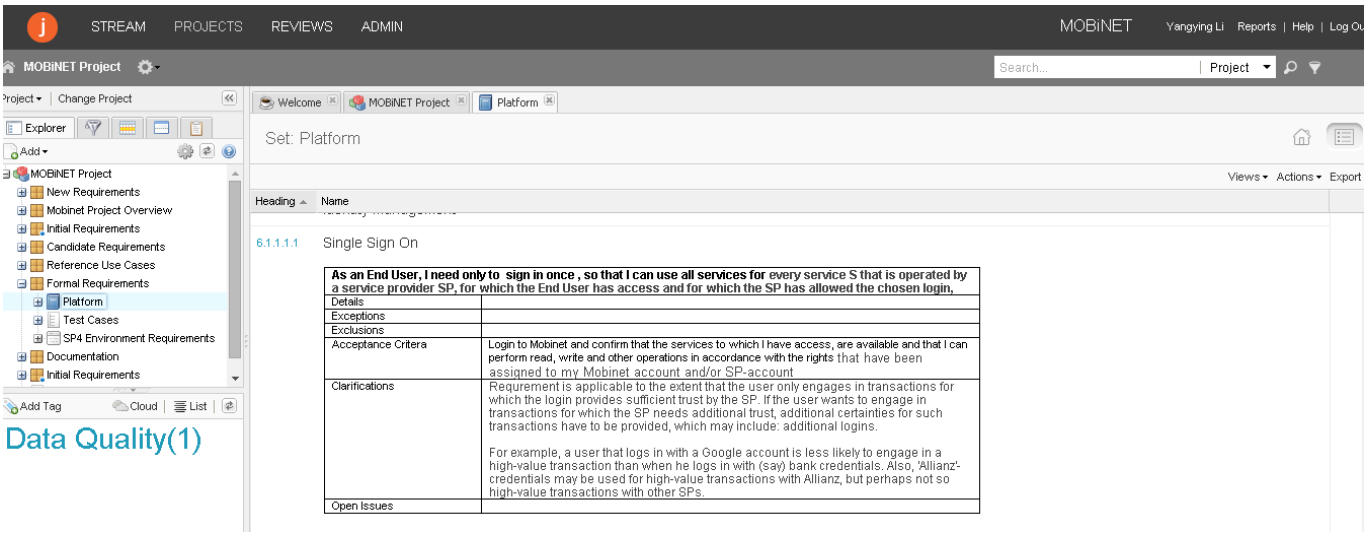

Figure 2 MOBiNET requirement tool JAMA

Requirements are grouped into two categories: functional requirements and non-functional requirements. A functional requirement defines a function of a software system or its component. A function may include: inputs, the behavior/process, and outputs. Functional requirements can be various such as calculations, data manipulation and processing and other specific functionality that define what a system is supposed to achieve. Functional requirements are derived from pre-defined use cases. Functional requirements are supported by non-functional requirements, which present constraints on the design or implementation, such as performance, security, privacy, expandability, accessibility and availability etc.

1.3. Terminology in Description of User Needs

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted below.

- “MUST”; this word, or the terms "REQUIRED" or "SHALL", mean that the definition is an absolute requirement of the specification.
- “MUST NOT”; this phrase, or the phrase "SHALL NOT", mean that the definition is an absolute prohibition of the specification.
- “SHOULD”, this word, or the adjective "RECOMMENDED", mean that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.
- “SHOULD NOT”, this phrase, or the phrase "NOT RECOMMENDED" mean that there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
- “MAY”; this word, or the adjective "OPTIONAL", mean that an item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because the vendor feels that it enhances the product while another vendor may omit the same item.

2. Functional Requirements for Key Components of the MOBiNET Platform

2.1. Key Components and Features of the MOBiNET platform

Figure 3 shows the current components of the MOBiNET platform. Key components are:

- Service directory, which is a database of mobility service providers and data vendors;
- App directory, which is a database of mobility services for end users;
- MOBiAGENT is the interface to end users which can be used to access MOBiNET services
- Communication Agent, which links end users with the MOBiNET platform;
- Identity management, which manages users' login information and profile;
- Dashboard is an interface to service providers which can be used to manage their profile, edit services in the Service Directory etc.
- SDK (Service Development Kit) is a tool to be used by a service provider to create a MOBiNET compliant new service;
- Payment management or billing, which manages payment from different services and users

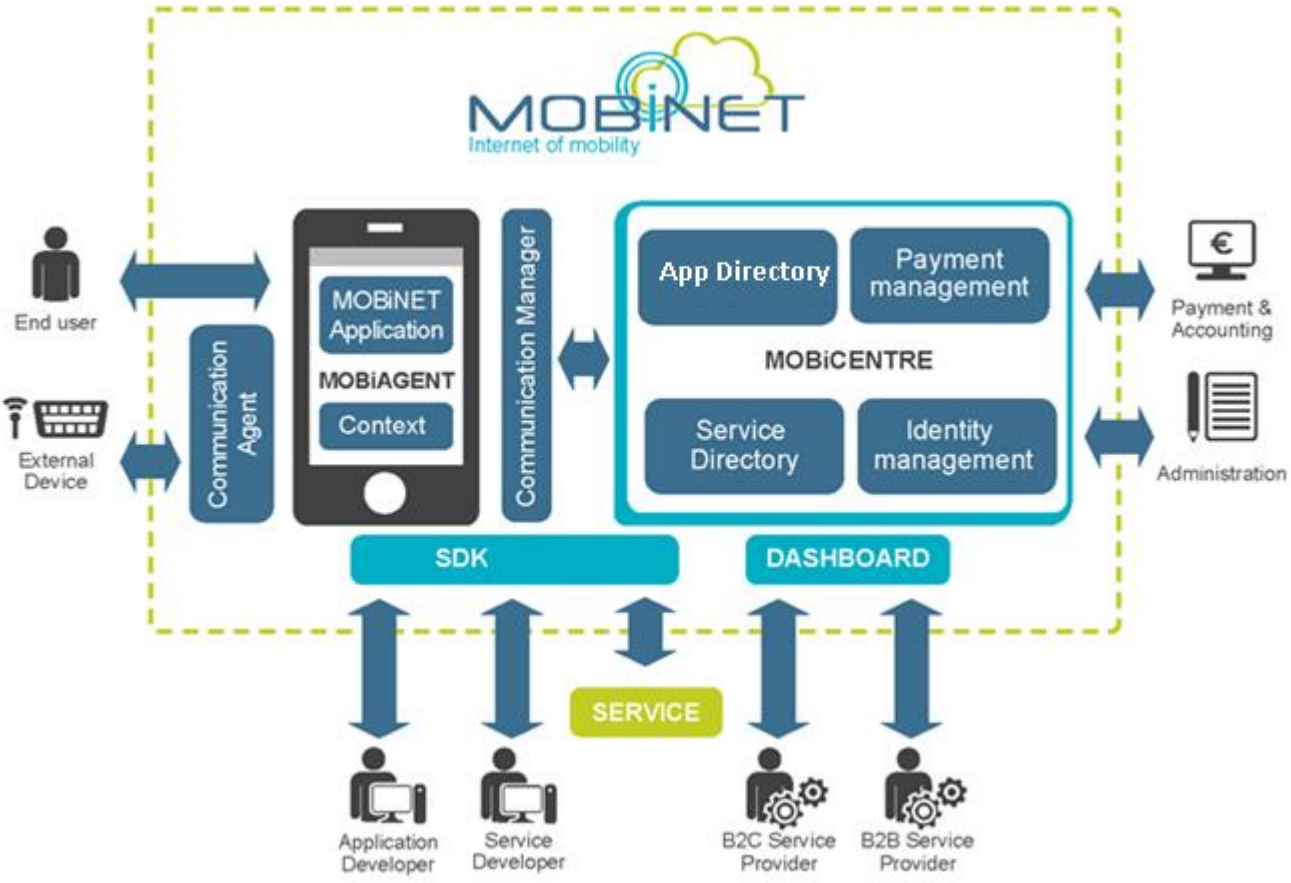

Figure 3 The Current Components of The MOBiNET Platform

2.2. Requirements for Individual Components

2.2.1. Service Directory

- Functionalities
  - Store service descriptions – not services
  - Perform indexing for fast lookup and discovery of services
  - Enable M2M service discovery
  - Add/Remove/Download service description
  - Lookup service description based on ID
  - Discover service description based on service type and geographical area
  - Interactions through widgets on Dashboard
- Initial Service Description format
  - XML/RDF format
  - Currently focused on technical aspects of services
- Users
  - Service developers, data/ service owners.

Requirements for Release 2 are shown below:

Usage Statistics for each service	
Details	Service directory should be able to provide usage statistics of a service to the service provider. How often did a certain user use the service, and how often was it used on a certain intersection would be the main statistics. Also per weekday and time of day.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	This function should be provided to users through Dashboard.
Open Issues	

Tag/price/functions/topics/geographic area-based service description search	
Details	A user should be able to search the service directory based on different criteria such as: - Functions

	- Topics - Price - Geographic areas (e.g. Cities).
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Link service description to organization	
Details	The service directory must provide information of a service on who provides the service to the service directory.
Exceptions	
Exclusions	
Acceptance Criteria	Only the organization who owns the service (who originally registers the service) can modify or delete the service description. Ownership of a service must be protected.
Clarifications	
Open Issues	How to prevent a third party to register a service which does not belong to the organisation

Persistent service discover query	
Details	In the case where a certain type of service is required, e.g. a service providing information about parking spaces in the area, a service or an app could extend a discovery query containing specifications of the service and context of the user (e.g. location) and when new services match the query they are automatically extended to the querying service or app.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Associate USDL description with service description	
Details	This is to take advantage of the advanced and extensive coverage offered by USDL.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	

Open Issues	

Report service usage for billing purposes	
Details	In order for the billing module to know how much and to who to extend billing information there service usage must be monitored.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Extended widget functionalities	
Details	The widgets should be modified to comply with the added functionalities.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Service example usage should be provided	
Details	Add possibility to see an example of usage of the service described by the service description that is found via discover or lookup, i.e. example input/output.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Data catalogue of available data types should be provided	
Details	Containing the data formats/types available via the services in the service directory, and to see the data formats recommended by MOBiNET.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Search for services based on output data type/format should be provided	
Details	By searching for services based on the data format a query can be more

	focused on the content of services rather than the form or type.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

The service directory should make widgets browser independent	
Details	Guarantee that widgets work in all major browsers (e.g. Internet Explorer, Google Chrome, Safari, etc.).
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	Currently the widgets are only guaranteed working in Firefox.

2.2.2. App Directory

Functionalities

- Manage app descriptions via Dashboard widgets
- Add, remove, update, download
- Interaction from MOBiAGENT App Directory frontend

Initial App Description format

- XML/RDF format
- Containing information regarding hosting, type, service area, description, etc.
- Based on service description format

Users

- App developers and owners
- End users indirect users via MOBiAGENT

Requirements are:

Existing websites/apps access to be guaranteed	
Details	App directory should ensure that services can be offered to end-users through Service Providers existing websites/apps
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	Currently, app directory only allows an end service provided as ‘App’. How to provide website based service should be taken into

	consideration.

Review, comments and rating for an app	
Details	A user should be able to give comments, review and rate an app. Other users should be able to see them.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Tag-based app description search	
Details	Search app descriptions based on tags.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Link app description to organization	
Details	The App directory should be able to link an app description to the organization of the user adding it to the app directory.
Exceptions	
Exclusions	Only that user or other users of his organization that can modify or delete the app description.
Acceptance Criteria	
Clarifications	
Open Issues	Is a third party allowed to register an app that does not belong the party?

Dedicated app directory	
Details	The current app directory is based on the service directory, which is why a more dedicated version should be made.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Dedicated app description	
Details	App directory should make the description format more dedicated towards apps, i.e. include icon, description, platform availability, etc.

Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	Who has the right to give app description?

Make widgets browser independent	
Details	Guarantee that widgets work in all major browsers (e.g. Internet Explorer, Google Chrome, Safari, etc.).
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	Currently the widgets are only guaranteed working in Firefox.

2.2.3. Communication Agent (CA)

The CA receives periodic updates from vehicles about their position (CAM messages). CA's interfaces are:

- UDP Socket based
- ASN.1 encoded

The CA receives information dissemination requests from service providers (e.g. GLOSA) to propagate information within a certain geographical area

- Interface is RESTful API

CA utilizes a basic dissemination algorithm to deliver the information to the corresponding vehicles.

Requirements:

CA instructions reception	
Details	Communication Manager is able to receive and decode CA forwarding instructions.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

CA instructions execution	
Details	CM executes CA forwarding instructions for further message propagation.

Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Coverage Information	
Details	RSUO/MNO to provide stations location and coverage information.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

2.2.4. MOBiAGENT

Currently, the Release 1 MOBiAGNET is

- Running on Android
- OSGI-platform available
- App Directory-UI
- SDK – UI
- Communication manager - UI

Requirements:

Background Alerts and Notifications	
Details	Application Developer may be able to publish alerts, for the End User, based on the current MOBiNET context even if the application is running in the background, so that user can be informed about any urgent or important information gathered from the service. Alerts have a defined text information and severity information. Alert can have following severities: - Critical [example: emergency broadcasts] - Important [example: traffic congestion ahead] - Notification [general information for the user] Alert can be associated with a timeout which determines how long the alert is shown on screen, and it may be indicated if alert is requiring user acknowledgement.
Exceptions	
Exclusions	
Acceptance Criteria	Start multiple MOBiNET applications on a mobile device. Make sure that the application sending an alert is in the background. Cause the background application to sent a alert by simulating or executing any

	action which will trigger the alert. Verify that the alert is shown to the user.
Clarifications	
Open Issues	

Control Events and Notifications	
Details	End User should to be able to control events and notifications they receive from background applications, so that they are informed about any urgent or important information regarding their trip. MOBiAGENT shall allow End User to control per application the type of notifications which user wants to screen on the UI in case an application broadcasts the alert. User must be able to control these settings globaly, per alert severity and separately per application.
Exceptions	
Exclusions	
Acceptance Criteria	Make sure that a application which will raise the alert is running on a mobile device; Configure so that no alerts are shown on screen. Simulate or invoke conditions which will trigger the applications to issue the alert. Make sure alert is not shown. Configure so that application alert will be shown. Again simulate or invoke conditions which will trigger the applications to issue the alert. Make sure this time alert is shown.
Clarifications	
Open Issues	

Vehicle ITS Station (On-Board Unit) (OSGi) Support	
Details	Application Developer should to be able to build MOBiNET application for a vehicle on board unit, so that they can use MOBiNET applications within vehicle on board systems they are developing. MOBiAGENT shall support any OBUs which use one of MOBiAGENT supported operating systems.
Exceptions	This is only valid for the Android OS.
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	Need to define which devices are required to be supported.

End User Network Preference Selection	
Details	End User need to be able to define network preference, so that they can prevent MOBiAGENT from using a particular type of network or explicitly

	favor using one or more network types.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Automatic Connection Selection	
Details	Application Developer should to be able to have connection to the backend automatically established, so that they do not need to manage the connection to the backend. Connection to the backend service should be transparent to the application, with exception of setting preferences for network selection. Commnication manager must be able to fall back to different strategy for connecting to the backend if there is a long term connection brakeup. User should be able to configure period of time for switching between networks in case of connection brakeup.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Application Network Preference Selection	
Details	Application Developer may be able to define network selection preferences, to optimize the way my application access the Service Backend. Applications may be able to communicate with the backend service using one or more network types, or may be able to communicate using only a specific network. As an example an application may require to only use 802.11p or may explicitly disable this type of connection. As list of possible network types may change with time: all those network types which application does not mark as preffered or disabled can be used to establish the connection to the service backend.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Selection of location provider	
Details	Application Developer may be able to define which of the location

	providers are preferred to provide location updates.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

2.2.5. Identity Manager

Current statue of the component:

- Basic User Entity Management, allowing the registration of users and associated attributes in the internal Registry, including the assignment of roles in a hierarchical way for business users;
- User authentication using using the internal MOBiNET OpenID provider;
- Identity provisioning for user entity;
- Attribute provisioning: basic attributes for user entities.

Requirements:

Access control of an app to use specific MOBiNET service using OAuth 2.0 (Client Credential grant)	
Details	This might be one of the way to provide access control, related to an application. Registered trusted clients are allowed to obtain the access token by providing their client key and client secret to Authorization Server. This token will be used to call the service; that service can verify the validity of that token contacting the Authorization Server.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Access control based on some attributes of the authenticated user	
Details	The user ID provided during the previous OpenID authentication phase should be provided as an input parameter of a specific interface of the Authorization Server that will provide back the user role and possibly some other information like the Party identity (e.g. the ID for Alliance if the user is registered as a business user).
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	A further investigation of relevant attributes is required, and they may need to be introduced during the user registration phase.

Use of external IdPs for authentication	
Details	The internal MOBiNET IdP is contacted directly in release 1 to provide the user authentication: so, for the time being, the Dashboard is the OpenID relay party and it directly implements its client side protocol. In Release 2, because the authentication should be provided not only by the Mobinet IdP but possibly also from an external one (e.g. a party IdP or even a social one for end-users), some changes should be provided in order to let the MOBiNET platform be able in any case to fully control all the process and properly log and maintain the security/billing issues. Therefore an Authentication page, that let the user choose the desired IdP for his authentication, should be provided by a module inside the MOBiCentre and presumably inside the Identity Manager, that is the subsystem in charge of the authentication feature.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Revise the user management procedures and manage appropriate attributes, possibly extended the IDM to manage not only users entity but also other relevant ones if needed.	
Details	
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	For the time being a basic user management is provided in release 1 that implements only some of the needed procedures. Moreover only a minimum set of profile attribites are consiodered.
Open Issues	Review and an extension of the user management module is needed, implementing all the relevant procedures (e.g. user delete/ disable), taking into accont all the relevant attributes and possibly extending the management also for other entities if needed.

2.2.6. Dashboard

The MOBINET Dashboard is the access point for service provider in the MOBINET ecosystem. Here they find new services. Here they can register their own services and apps. Here they get the latest information about the dynamic MOBINET ecosystem. Here they get their billing information and see what is happening with the MOBINET services. The Dashboard makes MOBINET real for the professional community MOBINET is serving. For Release 1, the Dashboard focuses on:

- Access to MOBICenter functionality
- Login

- Access to Service Directory and AppDirectory

Requirements:

Dashboard Analytics Server	
Details	The Dashboard requires an additional server component taking care of analytics of service requests, app requests and service usage.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Widgets to display the analytics	
Details	Widgets visualizing the important metrics for service providers .
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Servicedirectory interface to analytics server	
Details	An interface to report service requests towards the analytics server.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Appdirectory interface to analytics server	
Details	An interface to report app requests towards the analytics server.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

MOBiAgent interface to analytics server	
Details	An interface to provide local service information like current position, user input to the service and additional information provided by the device (sensor information).
Exceptions	

Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Metrics for the analytics server	
Details	Metrics deriving user behaviour based on service, app usage, location information and additional sensor data provided by the mobiagent.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

2.2.7. SDK

Current SDK for Release 1 provides the following functions:

- Development Environment
- Editor for Service Descriptions
- Documentation how to create services

Requirements:

Extended Tutorials	
Details	Cover more advances web service development aspects (i.e. object serialization), REST APIs und the APIs to be included in the SDK (see below) should be provided
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Improved Service Editor	
Details	Usability and new enhancements in file format of service description format should be provided
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	

Open Issues	

API for Service Directory/ Idenity Management/ Billing	
Details	Java Wrapper around REST API of the Service Directory/ Identity Management/ Billing should be provided
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

REST API of Service Directory/ Identity Management/ Billing	
Details	API of the Service Directory/ Identity Management/ Billing must be provided to perform operations on it
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

2.2.8. Payment Management / Billing

Currently this component is not available at Release 1 stage. Therefore, the requirements include all requirements (rather than updated requirements only):

Transaction Manager	
Details	The Transaction Manager (TrM) module is in charge of all MOBiNET Transaction Orders (TO) coming from either a MOBiNET-owned APP or a SP-owned APP using the Billing Subsystem (BS) functionalities. The TO is a MOBiNET financial transaction involving either a payment or a taking operation through the BS and among MOBiNET stakeholders: EU, SP, MOBINET Administrator. All of the TO have to be tracked and all of the TO details have to be stored in a Transaction Manager DB (TrMDB) to be accessible by all MOBiNET Stakeholders through devoted Transaction Manager User interfaces (TrMUI). The TrMUI has to allow Stakeholder to explore the whole history of its own TOs TrM is the key and upper module of the BS which has to intercept and govern any operation deriving from a TO such as payment, clearing, billing. TrM is in charge of the interface with the Payment Manager (PM) module and arranges a payment/taking operation by issuing a Payment Order (PO) to the PM.

	The PM is in charge of the interface with the "Licensed Bank" (LB) interface i.e. the whole set of the WEB-based payment options more acceptable to the MOBiNET Stakeholders. PM have to take into account all available, up-to-date and widespread e-commerce solutions. PM handle a payment by issuing a Bank Order (BO) to the preferred LB. TrM is in charge of the interface with the Billing Manager (BM) module and arrange a bill/receipt document by issuing a Billing Order (BO) to the BM. BM is responsible for issuing either a bill and/or a receipt for any completed PO and has to issue a fiscally relevant document if MOBiNET revenues are concerned. TrM is in charge of the interface with the Clearing Manager (ClM) module and arrange a clearing operation by issuing a Clearing Order (ClO) to the ClM. ClM is responsible of the recording of day-by-day fees due by each SP to MOBiNET depending on the claimed intermediation services. Furthermore, ClM, on a monthly basis, has to clear the overall debt of each SP by issuing a PO in favor of MOBiNET
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

BS requirements identified for the Release 1, as presently reviewed and coordinated in order to comply with the updated version of the BS architecture, functionalities and working hypothesis	
Details	MOBiNET (the BS) has to allow EUs to pay their transactions involving several services and several SPs as one single transaction (one single payment) MOBiNET has to provide receipts that are legally valid (according to local laws) for its taking towards EUs and SPs PM has to perform payments from EUs to SPs and between SPs ClM has to perform clearing of payments from SPs to MOBiNET SP operating through MOBINET has not be limited to use only PM solutions offered by MOBiNET MOBiNET has to provide support for different payment schemes based on customer (EUs, SPs) choices (i.e. fixed monthly charge for fixed bandwidth, pay-per-use, fixed fee for the full contractual traffic) MOBiNET has to provide support for different pricing models based on customers (SPs) choices: promotional offers (based on services, vehicle, country, period etc.) trial period (service, vehicle, country, period). The billing solution has to comply with local currency and taxation (where applicable). The TM module has to provide updated information on MOBiNET

	transaction details as far as TOs, POs, BOs and ClOs are concerned. PM (and LB) module has to manage involved payment data in a secure way (secure session). EUs as well as SPs must be able to manage accounting of all payments allowing queries for any historical payment MOBiNET Service and Application should have own SLAs defining how 3rd party using it will be charged EU has to be able to authorize the Services / APPs payment
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Test "Define cost for service usage"	
Details	A SP, during the uploading of a USDL service description in the SD, has to select one of the MOBiNET pricing schemes ID.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Connect to a Service in SD	
Details	SLA references are included in the service registration process and SLA (among EUs and SP) detailed description is part of the SP APP (while SLA among SPs and MOBiNET is part of the SD description).
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Handling of failure in case transaction (payment) fails	
Details	Service delivery is due only if PO is completed.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

MOBiNET prepaid account

Details	Pre-paid account might be considered and applied by the PM and LB modules depending on the WEB-based payment tools activated in MOBiNET.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

Single bill for SP	
Details	BS manages as a unique transaction (under the EU payment and receipt point of view) either one single service/ one single SP or several combined services/ several combined Sps.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

History of usage	
Details	The BS has to track and record "usage" history of TO (payment, billing, clearing) and not of services which is in charge of each service / APP.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

3. Non-Functional Requirements for the MOBiNET Platform

3.1. Accessibility and available must be guaranteed by designed

As a Service Developer, I need to have the MOBiNET SDK and Dashboard available for my development platform, so that I can develop and access services using MOBiNET core functionalities.	
Details	SDK and Dashboard should be usable from most popular mobile and web development platforms: - SDK and Dashboard must be available for Java platform - SDK should be available for Microsoft .NET platform
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

As a End User, I need to access MOBiNET applications using devices with different screen sizes, so that I can use MOBiNET applications from different devices which I posses	
Details	MOBiNET shall operate on devices with following screen sizes: • iPhone 5: 1136×640 4S: 640×960 3GS: 320×480 • iPad First & second generations: 1024×768 Third generation: 2048×1536 • iPad Mini 1024×768

	• Android Phones & Tablets Small screens: 426dp x 320dp Normal screens: 470dp x 320dp Large screens: 640dp x 480dp Extra-large screens: 960dp x 720dp
Exceptions	
Exclusions	Only Android support is required for Release 1 on a phone only
Acceptance Criteria	Load and execute MOBiAGENT with a running MOBiNET application on devices with defined screen sizes. For Android devices repeat the test for at least 3 different manufacturers for each of the screen sizes.
Clarifications	
Open Issues	

As an End User, I need to be able to access MOBiNET services from my mobile device using Cellular Network, so that I can use my MOBiNET application	
Details	
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

As an End User, I need to be able to access MOBiNET services from my mobile device using 802.11p Network, so that I can use my MOBiNET application requiring the 802.11p network.	
Details	
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

3.2. Security must be guaranteed by designed

As a MOBiNET User (end user and service provider), I need to be sure that my payment data is managed in a secure way, so that my payment data is accessible only by the party to whom I am making a payment.	
Details	
Exceptions	
Exclusions	

Acceptance Criteria	
Clarifications	
Open Issues	

As a MOBiNET user (end user and service provider), I need to be sure that communication between the system & my mobile device/vehicle are secure, so that any unauthorised access should be prevented and notified to me	
Details	
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

3.3. Privacy must meet EC legislation

As a End User, I should have consistent approach in regards to handling private data when using my applications and services in accordance with locally applicable legislation, so as I do not have to learn how privacy management works for each different application	
Details	Although privacy data is affected by the EU laws, in cases of any contry within or outside the EU, other laws might be applicable which override the EU directives. Local laws also must be adhered in order to obtain trust between all parties in MOBiNET. MOBiNET should provide a framework for Service/Application Developers which will allow consistent UI and workflow in defining privacy rules for the End Users.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

3.4. Expandability

As a service developer, I need to be able to change my service coverage.	
Details	My service is registered in the service directory. When the service is expanded geographically, i.e. integrate data from new areas and increase coverage, I don't need to register it again.
Exceptions	

Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

As a service provider/developer, I need to add new functionalities/data to my service/data which is registered in Service Directory, so that I don't need to register my service again.	
Details	My service can be expended with new data or new services without re-register in Service Directory. I should be able to update the service description and change characteristics if needed.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

3.5. Performance

As an end user (traveller), I need to have the same performance level covering areas up to the size of Europe.	
Details	
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

As a service provider or end user, I need to be informed when malfunctions occur.	
Details	Malfunctions should be informed to users (service providers or end users). The system should inform users if it operates in a degrade mode.
Exceptions	
Exclusions	
Acceptance Criteria	
Clarifications	
Open Issues	

The operation environment should be in active state for 24/7	
Details	It is foreseen that the environmental environment will provide a 24 hours 7 days a week availability. Precautions will need to be taken to guarantee the

	availability of the MobiNet services. In order to save hosting costs, the COM ENV should not be active all the time and should be made operational only when needed.
Exceptions	
Exclusions	
Acceptance Criteria	Installation of a server needs to be (re-)installed within 1 hour.
Clarifications	Note that this requirement does not cover any failure of applications but only holds for the server.
Open Issues	

4. Conclusion

The MOBiNET platform is planned to have three Releases. Release 1 has been developed based on requirements collected in the first stage and three use cases. This document serves as input for development of the Platform Release 2.

The requirement study has been based on the current functionalities of Release 1, services planned to use Release 2 and service providers' expectations for Release 2. Requirement gathering with continue in the next two months when users can have more experiences with the platform Release 1. All requirements will be reviewed by the development team in order to prioritise them. The Integration team of the project will decide what requirements to be transferred into functionalities of Release 2.

The functional requirements for the eight components, i.e. Service directory, App directory, Communication Manager, MOBiAgent, Identify manager, Dashboard, Service Development Kit (SDK) and Payment management (billing), are described. Except for Payment management (billing), requirements are only for additional functionalities for Release 2. Since Payment management is not yet available in Release 1, all requirements for this component are presented in this report.

Non-functional requirements cover accessibility and availability, security, privacy, expandability and performance.

5. Appendix - Case Study: Services Built on MOBiNET Platform

Service developers and users who will use MOBiNET for their services are required to provide their requirements. Their requirements have been transferred into functional or non-functional requirements for each component. However, with the progress of service development and more interaction with the MOBiNET platform, more requirements are expected. Below there are some examples of services' requirements for the MOBiNET platform.

5.1. Parking Service requirements

Items	Answer
Identify role of different stakeholders (service providers) in the service development and their interactions with the MOBiNET platform	1) App developer (AAU and other potentials) → upload/update/delete using app directory 2) App developer (AAU and other potential) → discover using Service Discovery 3) Service developer (GateHouse) → upload/update/delete using service directory 4) Content provider (City of Aalborg) → upload/update/delete using service directory
Identify users' interfaces with the MOBiNET platform and different users' requirements for the interfaces;	1) Service directory 2) Identity management 3) Payment management 4) Dashboard
Identify different stakeholders' expectations for MOBiNET platform features; check if those expectations are met by the current Release?	1) Content provider: content directory 2) App developer: search for service information 3) Service provider: search for content providers **Requirement**: Service discovery functionality could be improved by including more options for searching: topic, price, etc (initial ERTICO requirement)
Indicate any needs for improvement in functionalities of the MOBiNET platform including new functionalities of existing components or need for new components	**Requirements**: 1) From Service Provider: Creation of a content directory using the same approach as the app directory: is not clear now where to find a service or content. 2) From End-user: More "user-friendly" environment for app discovery (to be done in the MOBiAgent?)
Other requirements from stakeholders for this service	1) App developer should be interested in different contractual options to be signed with the service provider (is this included in the service XML?) 2) If the apps are downloaded directly from the official app-stores how the payment will be managed?
End users' expectations for the service	The end-user should expect:

(based on literature review, existing research results and personal experience)	- To easily find different apps using the app directory (preferably app store) - To be able to see ratings and comments about the app - To use a unique identity and unique payment platform - To have a unique app for all cities
Other requirements from end users for the service	**Requirements**: 1) The service should be available for different cities using a unique app. 2) Route guidance to your car (in case of large parking zones or unknown cities): the app records the position of the car and when the end-user wants to get to the car receives guidance by foot

5.2. Truck Parking Service requirements

Items	Answer
Identify role of different stakeholders (service providers) in the service development and their interactions with the MOBiNET platform	5) Service developer (IRU Projects) → upload/update/delete using service directory 6) Content/Service providers (e.g. Alliance, etc) → upload/update/delete using service directory
Identify users' interfaces with the MOBiNET platform and different users' requirements for the interfaces;	5) Service directory 6) Payment management, as long as not mandatory to use 7) Dashboard
Identify different stakeholders' expectations for MOBiNET platform features; check if those expectations are met by the current Release?	4) Content provider: content directory 5) App developer: search for service information 6) Service provider: search for content providers **Requirement**: Service discovery functionality could be improved by including more options for searching: topic, price, etc (initial ERTICO requirement)
Indicate any needs for improvement in functionalities of the MOBiNET platform including new functionalities of existing components or need for new components	**Requirements**: 3) From Service Provider: Creation of a content directory using the same approach as the app directory: is not clear now where to find a service or content. 4) From Service Provider: Ensure that services can be offered to end-users through Service Providers existing websites/apps
Other requirements from stakeholders for this service	3) A business agreement needs to allow cooperation with different Service Suppliers

	4) Payment and identity management need to be optional features and not hard requirements.
End users' expectations for the service (based on literature review, existing research results and personal experience)	The end-user should expect: - To easily find different service offers in one and the same app, preferably the one that he already is using
Other requirements from end users for the service	**Requirements**: 3) Continue using apps that he/she is already using, without a requirement to start using a new, Mobinet app.

5.3. Incident warning

Items	Answer
Identify role of different stakeholders (service providers) in the service development and their interactions with the MOBiNET platform	**Data/content/service provider:** for incident warming / real time traffic data provider should be able to publish (real-time) incident in the directory, maybe even end-users could do this (automatically (Slow Vehicle warning). A navigation provider should be able to use this data for his service, maybe road operator would like to use the data themselves as well. I see an interaction with the FCD service, that data can be of great help for this service. **App developer** should be able to include the data in their app **Travellers** should seamlessly be able to use the data, by means of the app which incorporate the data. This app should work on smartphones as well as on equipment build in the vehicle. G5 communication could for time critical incidents be necessary. **Business users** same as travellers
Identify users' interfaces with the MOBiNET platform and different users' requirements for the interfaces;	The service would use the service directory in different manners, all kind of connections should take place there. ID M and payment should be able to be included in the service (payment for

	providing and using data?). Supporting components as dashboard, app directory, SDK will be used for this
Identify different stakeholders' expectations for MOBiNET platform features; check if those expectations are met by the current Release?	Payment, single sign on is not available right now, privacy and security is nog part of R1. The service directory and app directory should, but we will have to see how easy one can use this. To guarantee demand and supply to the service directory easy to use is an important requirement.
Indicate any needs for improvement in functionalities of the MOBiNET platform including new functionalities of existing components or need for new components	See above. Next to the additional functionality for Idm/ privacy, security and payments, the platform should be really easy to use for SP's and especially data providers. This is THE advantage for them. To provide their data with no hassle.
Other requirements from stakeholders for this service	See above
End users' expectations for the service (based on literature review, existing research results and personal experience)	Described under Travellers. If informed in time a traveller can be routed in time to another route, avoiding delays. Also in terms of safety (traffic jam warning) this would be beneficial.
Other requirements from end users for the service	For end users in general MOBiNET is transparent, for them an app should be easy to download, use and payment (if necessary) should be easy. Apps working while driving should not require any interaction, due to safety.

5.4. FCD

Items	**Answer**

Identify role of different stakeholders (service providers) in the service development and their interactions with the MOBiNET platform	- FCD data gathering
	  ○ No link to MOBiNET necessarily, unless MOBiNET can be used for collecting end user data (e.g. location info from MOBiAGENT)
	- FCD data provision
	  ○ Describing service to service

	directory, provision of data source
	- FCD data fusion, integration and processing
	  o Finding FCD data sources from service directory
	  o Publishing processed data as a new service in the service directory
	- FCD data utilization (e.g. traffic status information service, congestion prediction, visualisation)
	  o Searching for FCD data sources (raw and processed)
	  o Publishing app in app directory

Identify users' interfaces with the MOBiNET platform and different users' requirements for the interfaces;	Stakeholders for the FCD use case (further details later on): **Data/content/service provider** and **Business user** (service developer/aggregator) <u>Dashboard</u> - **Service management:** App provider should be able to manage the users (e.g. usage limitations and customization, gathering usage statistics). - **Common APIs and toolkits:** Service developers should be able to use FCD data services in a harmonized/standardized way by connecting to different data sources with as little customization as possible. <u>Service Directory</u> - **Service registration:** Service providers and developers must be able to register/publish their services in the service directory. - **Service discovery:** Service developers must be able to discover relevant (e.g. based on location, data type) service providers (e.g. FCD data providers). <u>SDK</u> - **Service definition:** Service providers

	and developers must be able to provide and edit/update their service definitions.
Other requirements from stakeholders for this service	Payment - **Clearing** between the data providers and data exploiters should be done in MOBiNET's Payment Management. Identity and security - **Anonymization**: If MOBiNET gathers user data somehow (e.g. via MOBiAGENT), the user identity must be anonymized. - **Location tracking:** If MOBiNET can gather FCD data from end users (e.g. via MOBiAGENT), the user must be able to prevent this is he/she so desires (e.g. switching it on/off temporarily).