WP4 Urban Sharing Platform - Requirements

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Document Change Log			
Version	Date	Editor	Summary of Modifications
D01	17/06/2016	Jason Warwick	Initial Draft with Index & content layout
D02	20/06/2016	Jason Warwick	Internal Review
D03	01/07/2016	Jason Warwick	Initial Deliverable Release
D04	27/11/2016	Jason Warwick	Updated with requirements from WP3 Use Cases

Executive summary

This documents captures the requirements of the Sharing Cities project which will be used as input to architect, design and build the Urban Sharing Platform (USP).

Task 4.1. City Requirements Gathering: Consolidated recording of London, Lisbon and Milan technical requirements, enhanced by feedback from WP2 Place and WP3 People.

This deliverable contains the consolidated description of London, Lisbon and Milan technical requirements, enhanced by feedback from Citizen Engagement WP or other WPs.

Where possible the USP requirements will align with the Requirement's Specification for the European Innovation Partnership for Smart Cities & Communities (EIP_SCC) Integrated infrastructure Action Cluster – Urban Platform.

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1 Introduction & Overview

1.1 References and Supporting Documentation

The following references and supporting documentation described below are appropriate for this requirements document.

1.1.1 Business/ Functional Document References

- H2020-SCC-2015 SHAR-LLM Proposal

1.1.2 Technical Document References

- SCC EIP Requirements Specification for Urban Platforms

2 Urban Sharing Platform Context

2.1 Overview

In the Sharing Cities bid from May 2015 the following was proposal in relation to the requirements gathering for WP4. While much of what was proposed will be adopted some changes may be made where necessary as the project evolves over its 5 year lifecycle. In particular, there are significant dependencies for USP requirements definition on WP3 Place and WP2 People. It is expected that the WP3 USP requirements will be identified first and the WP2 requirements later as the People activity is planning to deliver the relevant tasks in 2017.

2.1.1 Sharing Cities Bid Extract

City Requirements Gathering *(Coord. UrbanDNA) Project Schedule: Month 1 to 6 - This task takes a co-ordinated approach to gather, validate and then consolidate the requirements of London, Lisbon and Milan based on the use cases for the proposed work packages. From this a baseline range of functional and non-functional requirements will be identified and prioritised per their impact and benefit with priority given to requirements common between the cities.*

This task includes these activities:

i. Capture and consolidation of main common, cross-city technical requirements for the USP linked to key interventions.
ii. Capture and refinement of local, city-scale technical requirements for the USP linked to key interventions.
iii. Capture what data the project will generate or utilise to support the Data Management Plan (DMP, see Task T3.4).
iv. Consolidation and refinement of technical requirements related to, e.g., compliance to standards, national or international regulations.
v. Specification of the set of requirements to be addressed and fulfilled by the USP.
vi. Involvement of cities, citizens and relevant stakeholders in the definition of use cases linked to the People WP.

2.2 SCC EIP Requirements for Urban Platforms

The SCC EIP Requirements, which are currently in draft form, have been utilised where relevant. In turn the requirements defined by Sharing Cities will be fed back to the EIP to enhance their dataset.

2.3 Relationship with other key Work Packages

Most of the requirements for the USP are provided by other work packages, primarily WP3 & WP2 with a little from WP5. This is because the USP largely exists to enable functions of the services which these work packages deliver including SEMS, Humble Lamppost and mobility. Therefore, a dependency exists on those work packages to provide information in a timely manner.

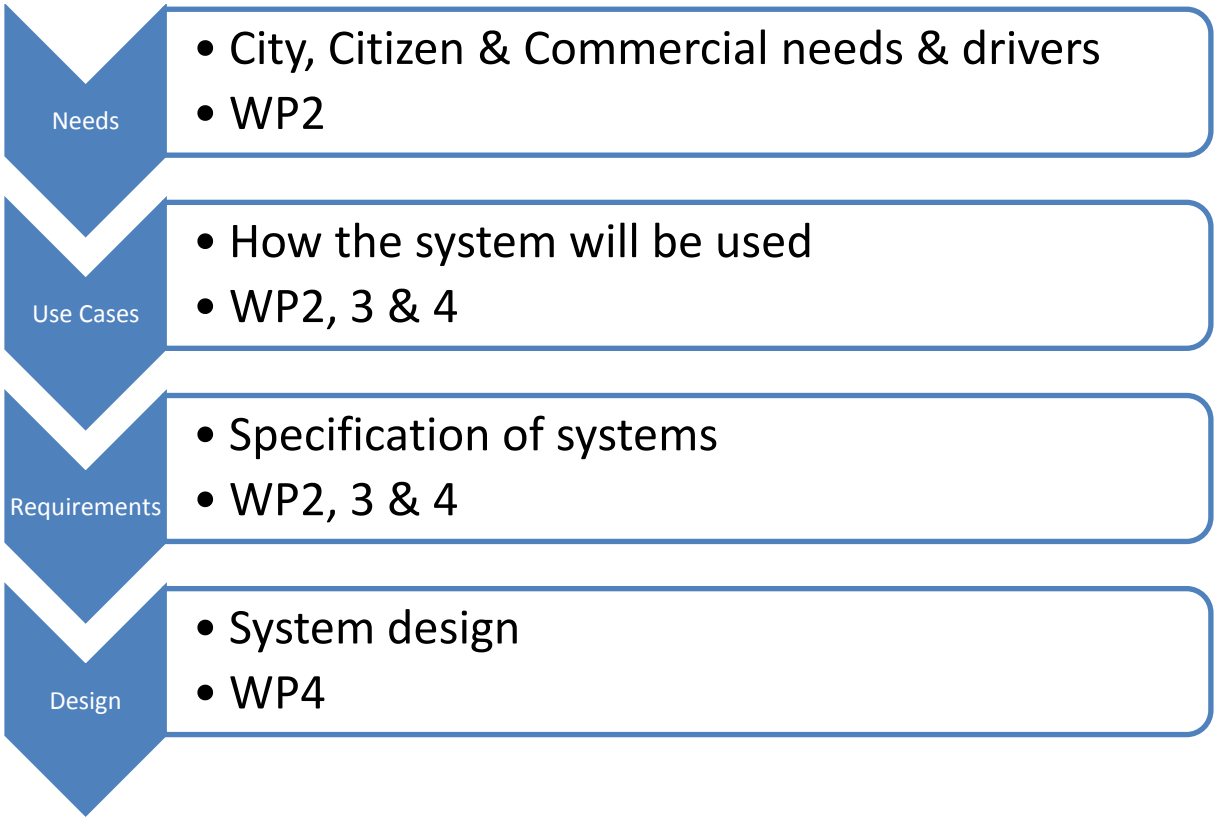
To manage the identification and gathering of requirements between key stakeholders; city's, citizens and work packages, the definition of Use Cases has been a valuable tool.

A use case is a written description of how users will perform tasks on a system. It outlines, from a user's point of view, a system's behaviour as it responds to a request. Each use case is represented as a sequence of simple steps, beginning with a user's goal and ending when that goal is fulfilled.

An example of a use case is to determine if EV Charger parking place is available. In this example, there is a requirement for the parking sensors supplied by WP3 to be connected to the USP which will gather the occupancy data and both provide real-time status of EV Charger Parking availability and reporting on historic usage patterns. Furthermore, there is much more detailed set of technical requirements which flow from this about the dataset such as volume, frequency and format.

In the following Diagram 1 – Use Case Value Chain, illustrates the relationship between City Stakeholders needs, Use Case, Requirements and USP (System Design).

Diagram 1 – Use Case Value Chain



2.4 The Wider City Context

This section outlines why requirements are vital to capture and design to the cities needs.

2.4.1 WHY – Use cases for the USP

Use cases for the USP describe why it is needed. The 'why' has three components:

- Why a city platform is needed
- Why the people of a city, represented by WP2 need the USP
- Why the infrastructure of a city represented by WP3 need the USP

2.4.2 WHAT – The USP Reference Architecture

The USP Reference Architecture describes the functions that will be developed for the USP. Although the RA has many components Sharing Cities is focusing on 3 main groups of functions:

- **API**: API & Data Sharing Layer — Move and share applications & services between cities
- **DATA**: Data Storage & Analytics — Standardised storage and processing of data
- **DEVICE:** Device Sharing Layer — Logical connection of any device to platform in any city

2.4.3 HOW – The USP Solution Design

Through the plan for the USP, each city is creating a solution design for the embodiment of the USP in their city. The solution design, in particular, needs to consider the requirements of the city on order to ensure the built solution meets the needs of the city.

2.5 Design and Implementation Constraints

2.5.1 Design Constraints

- Lack of standards agreement for metadata representation.
- City data found in existing data catalogues may require special consideration concerning the type of formats and datasets that must be stored within the platform.
- Requirements mismatch due to increased number of stakeholders involved in the design

2.5.2 Implementation Constraints

- Evaluation and testing of software options is expected to occur prior to selection and implementation of a production urban platform.
- Budget costs are unknown until evaluation of software options is completed.

2.5.3 Assumptions

Table 1 - USP Assumptions below outlines the assumptions relevant to the definition of USP requirements

Table 1. Assumptions

#	ASSUMPTION
1	The providers of city data and services will be responsible to maintain their resources in the platform.
2	All city data must meet the minimum metadata requirements and use the standards adopted by the platform.
3	The platform shall consider open Source as an optional commercial model, with open standards as a principle
4	The system design and architecture should minimize fragmentation of city data in the urban platform.
5	To the extent possible, automation should be used for the extraction of descriptive and technical metadata.
6	The platform must be designed in a way it accommodates additional functionality at later stage at a fair and transparent cost.
7	The platform must be a modular based architecture which relies on stable and well-defined open interfaces to ensure interoperability between the platform, services and the applications provided by service providers.
8	The platform will offer open and well-documented API's and clear service descriptions and contracts that is offered for reuse by another party to foster open innovation in the city, which means that developers and interested individuals openly utilize the resources provided.
9	Adopt open and published European and International standards where possible.
10	The platform must be flexible enough to accommodate different local, National and International data protection, licensing and commercialization regulations.
11	Platform providers will monitor emerging technologies in order to maintain and improve the architecture.
12	Platform providers will monitor emerging information standards, including metadata standards and data interface standards.
13	Platform providers will monitor new commercial models for city data exploitation

3 USP Requirements

The functional requirements of the USP have been grouped into two areas: Internal & external.

Internal requirements are those needed to support the basic functions of the USP and are broadly independent of the needs of the other work packages.

External requirements reflect the needs of the other WP's mainly WP3 & WP2.

WP2 – what data is output from the USP, its content, structure and format

WP3 – What data is input or captured by the USP and related specifications for devices to be connected.

3.1 USP Requirements

This Section Outlines the set of requirements to be addressed and fulfilled by the USP.

3.1.1 Generic

Id	Description	Type
G-001	The platform must be provided as a service	Generic
G-002	The platform must be multi-tenant	Generic
G-003	The platform must be reliable	Generic
G-004	The platform must provide open interfaces to ensure interoperability with applications, devices and enablers	Generic
G-005	The platform must have load balance mechanism	Generic
G-006	The platform must support multiple IP-based communication channels to interact with devices and applications	Generic
G-007	The platform must provide the capability for applications to communicate with devices regarding the communication technology	Generic

G-008	The platform must be auditable	Generic

3.1.2 Business

Id	Description	Type
B-001	The platform must support the register of publishers	Business
B-002	The platform must store publishers related information	Business
B-003	The platform must support managing terms of agreement with publishers	Business
B-004	The platform must support the commercialization of services	Business
B-005	The platform must support the commercialization of data	Business
B-006	The platform must provide service providers mechanism to specify business models associated to services they are providing	Business
B-007	The platform must provide service providers mechanism to specify business models associated to data they are providing	Business
B-008	The platform must provide mechanisms for users to subscribe open services	Business
B-009	The platform must provide mechanisms for users to subscribe paid services	Business
B-010	The platform must provide mechanisms for users to subscribe open city data	Business
B-011	The platform must provide mechanisms for users to subscribe paid city data	Business
B-012	The platform must support accounting mechanisms	Business
B-013	The platform must support the generation of charging records	
B-014	The platform must support the generation of charging records	Business
B-015	The platform must create billing items	Business
B-016	The platform must provide capabilities for top up payments	Business

B-017	The platform must support SLA monitoring	Business

3.1.3 Functional

Id	Description	Type
F-001	The platform must support synchronous communication mode (Request & Response)	Functional
F-002	The platform must support asynchronous communication mode (Subscription & Notification)	Functional
F-003	The platform must support application registration	Functional
F-004	The platform must support device and gateway registration	Functional
F-005	The platform must store application, device and gateway registration related information	Functional
F-006	The platform must support the discovery of devices and gateways	Functional
F-007	The platform must support the discovery of applications	Functional
F-008	The platform must support policies configuration	Functional
F-009	The platform support policies enforcement	Functional
F-010	The platform must support policies monitoring	Functional
F-011	The platform must support the communication between one application with multiple devices	Functional
F-012	The platform must support the communication between one device with multiple applications	Functional
F-013	The platform must ensure the delivery of a message to an application or device	Functional
F-014	The platform shall support the acknowledgment of message delivery to an application or device	Functional
F-015	The platform must support subscription to events	Functional

F-016	The platform must support notifications when subscribed events happen	Functional
F-017	The platform must support subscription of metada-based events	Functional
F-018	The platform must support metadata verification	Functional
F-019	The platform must support metadata completion	Functional
F-020	The platform must support notifications when subscribed metadata-based events happen	Functional
F-021	The platform must store application, device and gateway subscription related information	Functional
F-022	The platform shall support communications between applications and devices using continuous connectivity	Functional
F-023	The platform shall support communications between applications and devices using non-continuous connectivity	Functional
F-024	The platform shall be capable to communicate with devices connected through gateways	Functional
F-025	The platform must support the storage of application, device and gateway data	Functional
F-026	The platform must ensure the maintenance of information while valid	Functional
F-027	The platform shall support accurate, secure and trusted time stamping	Functional
F-028	The platform must make the data available, on request or based on subscriptions, subject to access rights and permissions	Functional
F-029	The platform must ensure that data and metadata are not corrupted during exchanges	Functional
F-030	The platform must enable sharing of data among multiple applications.	Functional
F-031	The platform must enable sharing of data among multiple devices	Functional
F-032	The platform shall support information delivery to devices on behalf of applications	Functional
F-033	The platform shall support information delivery to applications on behalf of devices	Functional

F-034	The platform must guarantee the delivery of information	Functional
F-035	The platform must archives relevant information exchanged	Functional
F-036	The platform must be skilled to monitor functionality the entire repository	Functional
F-037	The platform must support interaction with exposed services	Functional
F-038	The platform shall allow the monitoring and diagnostics of applications	Functional

3.1.4 Device management

Id	Description	Type
DM-001	The platform shall provide the capability for provisioning of gateways and devices	Device Management
DM-002	The platform shall support management of gateways and devices	Device Management
DM-003	The platform shall support configuration of gateways and devices	Device Management
DM-004	The platform shall allow the monitoring and diagnostics of gateways devices	Device Management
DM-005	The platform shall support performance management	Device Management
DM-006	The platform shall support fault management	Device Management
DM-007	The platform shall support software update	Device Management
DM-008	The platform shall support interworking proxy between different devices	Device Management
DM-009	The platform must support authorizing devices to access local area networks	Device Management

3.1.5 Semantic

Id	Description	Type

SE-001	The platform must support the usage of ontologies and semantic modelling of data	Semantic
SE-002	The platform must ensure a generic structure for data representation	Semantic
SE-003	The platform shall provide capabilities to represent other sources of information rather than devices	Semantic
SE-004	The platform shall support semantic descriptions management	Semantic
SE-005	The platform shall support a common information model for different verticals	Semantic
SE-006	The platform shall support interworking proxy between different modeling languages	Semantic
SE-007	The platform shall support the discovery of devices based on semantic descriptions	Semantic
SE-008	The platform shall be skilled to perform data analytics based on semantic descriptions	Semantic

3.1.6 Security

Id	Description	Type
S-001	The platform shall be robust against threats to its availability	Security
S-002	The platform shall ensure privacy	Security
S-003	The platform must protect user's personal information	Security
S-004	The platform shall support mutual authentication between platform and devices and gateways	Security
S-005	The platform shall support mutual authentication between platform and applications	Security
S-006	The platform must ensure the data confidentiality	Security
S-007	The platform must ensure the data integrity	Security

S-008	The platform shall be able to securely make the provision of security credentials in devices or gateways	Security
S-009	The platform shall support countermeasures against unauthorized access to applications and devices	Security
S-010	The platform must ensure that only registered application can access the platform	Security
S-011	The platform must ensure that only registered devices can access the platform	Security
S-012	The platform must ensure a controlled access to devices	Security
S-013	The platform must ensure a controlled access to applications	Security
S-014	The platform must guarantee that only authorized applications can access the data	Security
S-015	The platform must guarantee that only authorized devices and gateways can access the data	Security
S-016	The platform must guarantee that only authorized applications can update or write new data	Security
S-017	The platform must ensure that only authorized devices and gateways can update or write new data	Security
S-018	The platform must allow interaction between applications and devices managed by different providers subject to restrictions	Security
S-019	The platform must provide access rights mechanisms associated to data and metadata access	Security
S-020	The platform must enable anonymized data access	Security
S-021	The platform must ensure the data access control in the repository based on profiles	Security

3.1.7 Data

Req. ID	UC. ID	Description	Priority	Domain
FREQ.1	UC1	Allow data publishers to register to submit data for publication	Must	Societal Needs, Platform
FREQ.2	UC1	Tracks data publication agreements between Data and Platform Providers	Must	Business Needs, Platform
FREQ.3	UC1	Store terms of agreements, and use them to monitor/review/process data submissions.	Must	City Data, Platform
FREQ.4	UC1	Able to add and edit terms of agreement, based on access of level of user.	Must	Business Needs, Platform
FREQ.5	UC1	Data publications are managed and monitored	Must	City Data, Platform
FREQ.6	UC2	Allow authenticated users from across different organisations to publish city data	Must	City Data, Platform, Business Needs
FREQ.7	UC2	Provide authorization mechanisms for users and sensors to publish city data	Must	City Data, Platform
FREQ.9	UC2	Provide mechanisms for static data publication	Must	City Data, Platform, Business Needs
FREQ.10	UC2	Provide mechanisms for real-time data publication	Must	City Data, Platform, Business Needs
FREQ.11	UC2	Enable the publication of metadata	Must	City Data, Platform
FREQ.12	UC2	Maintain temporal information about the data	Must	City Data, Platform
FREQ.13	UC2	Support sensory data collection	Must	City Data, Platform
FREQ.14	UC2	Accepts content in numerous file types/formats	Must	City Data, Platform
FREQ.15	UC2	Prompts a request for resubmission to the data provider if an error of data transmission or receipt occurs	Must	City Data, Platform
FREQ.16	UC2	Enable the semantic description of connected devices	Must	City Data, Platform
FREQ.17	UC2	Gather data from authenticated and authorized devices	Must	City Data, Platform
FREQ.18	UC2	Validates automatically the successful transfer of the data	Must	City Data, Platform
FREQ.19	UC2	Performs virus checking on data	Must	City Data, Platform
FREQ.20	UC2	Verifies the validity of the submission based on submitter, expected format, data quality, and completeness	Must	City Data, Platform

FREQ.21	UC2	Platform should have built-in checks on the incoming metadata. Data not containing the minimally defined set of attributes should be returned to the publisher for metadata enhancement.	Must	City Data, Platform
FREQ.22	UC2	System should have a user-friendly method of mapping non-standard metadata elements into approved standard elements.	Should	City Data, Platform
FREQ.23	UC2	Once ingested, metadata should be stored in a single common format. This format should be one that ensures against data loss, and allows a variety of access/distribution options	Must	City Data, Platform
FREQ.24	UC2	Data in the repository shall have sufficient technical metadata to assure functionality (e.g. viewing and display) to ensure accessibility and reusability.	Must	City Data, Platform
FREQ.25	UC2	Allows publishers to display and perform manual/visual quality control assurance via a user-friendly GUI	Could	Business Needs, City Data, Platform
FREQ.26	UC2	Any errors shall prompt a request for resubmission of data	Should	Business Needs, City Data, Platform
FREQ.27	UC3	Enable data providers to manage their resources	Must	Business Needs
FREQ.28	UC3	A minimal set of identifying information/metadata concerning data publication submission must be recorded	Must	Business Needs, Platform
FREQ.29	UC3	Stores and tracks versions of data. Links /connections between versions are created and maintained	Must	City Data, Platform
FREQ.30	UC3	Give service and data providers access to anonymized data of the subscribers of their data or services	Should	Business Needs
FREQ.31	UC3	Enable data providers to maintain and repair data and metadata	Should	City Data, Platform, Business Needs
FREQ.32	UC3	Tracks data publication agreements between Data and Platform Providers	Must	Business Needs, Platform
FREQ.33	UC3	Store terms of agreements, and use them to monitor/review/process data submissions.	Must	City Data, Platform
FREQ.34	UC3	Able to add and edit terms of agreement, based on access of level of user.	Must	Business Needs, Platform
FREQ.35	UC3	Submission volumes and schedules are managed and monitored	Must	City Data, Platform

4 City Requirements

This section details the requirements from WP2 & WP3 which will be supported by the USP. Such requirements have been identified by the definition of Use Cases by the respective work packages.

This includes both the main common, cross-city technical requirements for the and the local, city-scale technical requirements for the USP linked to key interventions.

In this release, only the WP3 requirements are known as the WP2 People activities are still taking place. This is in line with Sharing Cities Project plan and is expected. The dependant WP2 activities are due in Q1 2017 and this document will be update thereafter. Detailed timings can be found in the Sharing Cities Project Plan.

4.1.1 WP3 Place Requirements

The City local and cross city requirements are extensive and is a living document which is a Google Sheet that is regularly access and updated by WP2, WP3 and WP4.

Included in here is a snapshot in the form of an embedded Excel document

4.1.2 WP2 People Requirements

The City requirements will be augmented in Q1 2017 with the output from WP2 according to the project plan. This will then be included in the next release of the Requirements document.