"Linked Open Apps Ecosystem to open up innovation in smart cities"

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Summary

This document presents the final version of the report on iCities digital footprint and gap analysis as a result of the assessment activities undertaken in Barcelona, London, Genoa and Bologna. This is a detailed report on the telecommunications and services infrastructures current status, a gap analysis and recommendations per city on the ICT infrastructure and data models required to support the different use cases scenarios and pilots defined by the iCity project.

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Executive Summary

The project “Linked Open Apps Ecosystem to open innovation in smart cities” – iCity – aims at making a step forward in fostering the co-creation of services of public interest by 3rd parties (developers, SMEs, …) that are pushing for their space as service providers in Smart City urban spaces. The project responds to the growing demand from social stakeholders to provide services of public interest based upon the exploitation of available public information, digital assets and infrastructure. In doing so, the concept of Open Data is encompassed within a novel approach of Open Infrastructures where the municipal ICT networks already deployed in urban spaces will be made available and accessible to open innovation ecosystems (especially SMEs) with the objective of maximizing the number of deployed services of public interest. The project is targeted towards the seamless integration of sensing, control and command functionalities available over public space, where apps will be developed to interact with a broad number of wired and wireless sensors and control devices, therefore supporting a new dimension of “city sensing and acting” enablement.

This document presents the final version of the report on iCities digital footprint and gap analysis as a result of the assessment activities undertaken in Barcelona, London, Genoa and Bologna. This is a detailed report on the telecommunications and services infrastructures current status, a gap analysis and recommendations per city on the ICT infrastructure and data models required to support the different use cases scenarios and pilots defined by the iCity project.

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1. Introduction

This deliverable D3.3: “Report on iCities digital footprint and gap analysis-final” describes how the digital assessment of the readiness of the cities to deploy *services of public interest* has been made by identifying the requirements of the proposed use case implementation examples provided by the various cities and the support offered by the currently available infrastructures. The gaps between the requirements and the existing capabilities represent the key additional features and functionalities to be provided by the iCity Platform.

This is the final version of the iCities digital footprint and gap analysis. This deliverable provides a representative status of the current telecommunications and services infrastructures, an assessment of the new features needed and recommendations per city on the ICT infrastructure and data models required to support the different use case scenarios and pilots defined.

Although this is a final deliverable, it remains a working document that will be further developed in close cooperation with the technical partners and the cities, as the evolving global project vision. Each release will define the current “snapshot” of the use case situation in each city and the iCity Platform feature set.

Note that some cities (e.g. London) have much experience of opening up *public data* for use by 3rd parties, whereas the strategy of other cities (e.g. Barcelona) is to focus on opening up *public infrastructures*.

Public infrastructures are those infrastructures that have been deployed across a city (mainly in open public spaces) in order to support the delivery of public services, such as urban lighting, mobility and traffic management or public security. They are composed of systems, devices and components intended to support the specificities of the services they support, and have normally been designed and deployed in order to be used and managed by civil servants and municipal employees, and their use or access is usually prohibited to private organisations or individuals.

Open Public Data, on the other hand, is the part of the information held or generated by a Public Administration that they have decided to publish regularly and offer as a public service. Opening up public data is intended to get citizens involved in society and political life, increase the transparency of public administration, and improve public decision making. It should be highlighted that part of the *public data* that could be opened could be, in fact, data generated by *public infrastructures*. This dimension a clear area of overlap that the iCity project takes seriously into consideration, as a side aspect of opening up *public infrastructures*.

Opening up a *public infrastructure* should not be confused with opening up access to a *public infrastructure*, as this would be an over-restrictive imposition to the overall potential of Open Public Infrastructures. It should also imply allowing 3rd parties to control the management layers of each infrastructure, under well-defined and manageable (by the Public Administration) rules, conditions and technical specifications.

As a consequence, it should be clear that opening up a *public infrastructure* is not just about getting access to the published data of this particular infrastructure, but interacting in operational conditions with the management layer of the infrastructure. This interaction includes specific actions (e.g., moving a camera) or specific real time demands (e.g. status demand of a device or

sensor value). Although it could be the case that data and related information could be extracted from Open Public Infrastructures, this data should only be considered as Open Data when the related service of public interest includes its publication in the open data repositories.

1.1 iCity Services of Public Interest

The iCity project is explicitly focused on the generation and deployment of the so called *services of public interest*, which should be understood as the evolution (and complement) of the cities' Public Administration's *public services*.

In this respect, *public services* are considered to represent "…. useful activities designated to meet a social need. Laws and regulations empower public service activities without indicating the motives for these services". They are created in order to satisfy a public need under the authority and control of a Public Administration organisation (at any possible level, i.e. state, regional, locality).

On the other hand, a *service of public interest* is usually accomplished by a non-public organisation (company, association, NGO or even citizens themselves). A public service responds to a "citizenship right" and constitutes a Public Administration duty, so its delivery is compulsory. A *service of public interest* responds to "citizenship need", the Public Administration is not obliged by any law to the delivery of the service.

The iCity project intends to secure the adequate conditions in order to make possible and viable that *services of public interest* can be co-created for public, private or individual innovative stakeholders therefore allowing for the existence of the widest possible public services portfolio offered by hundreds, if not thousands, of service providers.

1.2 City infrastructures

In each of the 4 cities (Barcelona, London, Bologna, Genoa) there is a pervasive physical network infrastructure throughout the streets and public spaces of the urban territory to which devices, such as sensors, actuators and user interface terminals can be easily and securely connected. Together with the data centres where network appliances, servers and storage resources are deployed, these comprise the integral components of this pervasive physical network infrastructure. This pervasive physical network is the underlying foundation for the iCity Platform. i.e., the iCity Platform will run on top of the network, making the whole Smart City ecosystem more efficient, integrated, scalable, robust, manageable and compliant with EU data handling directives.

Typically, the underlying transport network will be a Wi-Fi network and/or fibre optical network. Connected to these networks are a variety of sensors which provide real time information. These sensors belong to different families such as environmental sensors, mobility-detection sensors, cameras, etc., each operating with different protocols. The iCity Platform has to collect, integrate, analyse and present this data in a manner whereby it can be exploited by 3rd party developers to offer new and innovative services to local authority departments and the general citizen.

1.2.1 London

In London, access to the London tube Wi-Fi network with location-based services capabilities and sensors installed in the city will be provided through an API.

We also get access to the London air quality sensors via a JSON API.

The main resource that is made public is air quality monitoring data available for London, which has been recorded automatically since 1993. We also find a predicted grid of pollution levels at any location in London for current measurements.

Air quality is a complicated subject, and it can be worth reading up about it before trying to interpret data. A good place to start is the guide on the London Air website http://www.londonair.org.uk/LondonAir/guide/default.aspx

The feeds provided are still undergoing development, and may change in the future. This is a prototype service, and is subject to the King's College London Open License agreement.

Help on the interface can be found at:

http://webgis.erg.kcl.ac.uk/ArcGIS/SDK/REST/index.html?overview.html

This resource implements a REST interface amongst others. The REST interface returns data in JSON format.

Geographic Data can be found at following API:

http://api.erg.kcl.ac.uk/AirQuality/Hourly/MonitoringIndex/GroupName=London/Json

1.2.2 Barcelona

The public infrastructures that can be considered as firm candidates to be converted into Open Public Infrastructures are the following:

- WiFi Outdoor MESH Network.
- Barcelona WiFi Service Captive Portal.
- Barcelona Sensors Platform (BSP):
    - Air quality sensors.
    - Allergy sensors.
    - Acoustic sensors.
    - Temperature sensors.
    - Fire sensors.
    - Humidity sensors.
    - Flooding sensors.
    - Wind sensors.
    - Wave sensors.
    - Luminosity sensors.
    - Seismometer sensors.

    - People counter.
    - Street parking sensors.
    - Traffic sensors.
    - Mobile Phones as sensors.
    - Etc.

(All of these sensors can be public or private ownerships).

- Street Cameras.
- eGovernment Kiosks.
- Barcelona Optical Fiber Network.
- Barcelona Official Website (http://www.bcn.cat/).
- Barcelona Official Open Data Portal (http://www.bcn.cat/opendata/)
- Backend public applications and DBs.
- Hosting of external applications.
- Displays (in urban space):
    - In buses/metros/trains/tramways stops/stations.
    - TVs inside buses/metros/trains/tramways.
    - Displays in the streets.
    - Displays in shopping malls.
    - Displays in facades.
    - Etc.

(All of these displays can be public or private ownerships).

- Mobile surface charging points.
- Bicycle Stations (rent-a-bike public service).
- Automatic Bollards
- Traffic barriers
- Traffic Lights (in particular those traffic lights already adapted for blind people).
- Lane control lights (reversible lanes, parking to traffic shift)
- Street Lights.
- Street Parking Registers.
- Public Transport Vending Machines.
- Loud Speakers.
- Irrigation Network.
- Etc.

1.2.3 Bologna

Bologna is focusing on adding new features to the existing Iperbole Wi-Fi infrastructure. The focus here is on a single-sign-on capability that will make it easier for all partners linked to the Iperbole network to get access easily to all services.

1.2.4 Genoa

Genoa's focus is around providing information from their vehicle traffic system.

1.3 Use Cases

Each city has provided a first set of use cases, in order to assess the features and functionalities to be supported by the iCity Platform

These use cases are summarised below. More details can be found in the corresponding sections of this document.

1.3.1 London

In London, the use cases are targeted at providing location-based information via the iCity API, which 3rd party developers will be able to use to predict more accurately the arrival times of underground trains and provide real time information on how crowded it is in the tube stations.

Also, sensor information will be made available to drive innovative services.

1.3.2 Barcelona

In Barcelona, the use cases include outsourcing urban services through innovative transport services, making environmental data available, security and proving services for citizens with special needs.

1. Outsourcing urban services operators

   A large city could be interested in considering outsourcing the urban services provision to external operators. These operators would have to be given restricted access to the sensors platform , in accordance with the scope of the contract.

2. Mobility

   The calculation of the average travel times, based on traffic density using in-car Bluetooth devices detection.

   (Improved) Services related to available car-park locations, using both sensors and street cameras.

   Car-sharing services allowing citizens to share same rides across and around the Barcelona metropolitan area. The service will take advantage of the GPS feature of smartphones, which will provide the exact location of users willing to share their ride around the city. Through a mobile application other users will be able to check available routes real-time at their mobile phones and immediately ask for a ride.

   Ad-hoc public transport services, in which a small bus service may stop in response to customer demand at any point of the city. This on-demand service could be shared with other users taking the same direction. This service is especially valid for areas with deficient public transport or that lack of transport service during the night.

Bicycle rental services using the available municipal information about the bike lending service to establish movement patterns around the city. Another source of information could be the use of a GPS system to localize every bike in the city. This information would be useful to understand user's behaviour and to optimize the bike supply, by transferring them from full to empty stations.

3. Environment related services

Air pollution and allergenic (e.g. pollen) levels could be monitored using information coming from sensors placed on the street. A mobile application could be created to check at real-time the information of the air quality in a particular area. The service could also use the GPS feature of smartphones to provide information according to the user's location.

Information about pollution generated by industry could be used to create interactive maps where citizens could be aware of the total set of greenhouse gas (GHG) emissions caused by their surrounding industrial activity.

Energy saving systems (e.g. switching street lighting on-off according to the sunlight level captured by sensors).

Noise level indications from noise control sensors placed at street level.

4. Urban management through Territorial sectorization

Services provisioning and management at district level (political or geographical division).

5. Management of areas of special and local interest

Security within an area may be provided by a third company using the public infrastructure for sensing (movement and noise detectors) and monitoring (CCTV) the activity of the area, specially during nights and holidays.

6. Services installed by/for specific groups of citizens

Blind and deaf people, or people with *physical and psychological dysfunctions*, could wear intelligent devices to interact with city infrastructure to obtain, for example, the best way, according to their disabilities, to reach a place with public transport or move efficiently. These sensors could be included as a city asset.

Associations of people with *allergies* could develop their own services, for instance, meters to monitor pollen spread. These sensors could then be integrated into the sensor network of the city and used by other 3rd parties to develop other related services like pollen accumulation forecast or "Point of Aerobiology Information".

Elderly people could be provided with a device having a button that they can push if they are in trouble or have a problem at home. This service, commonly known as "red button", alerts the municipal social services that immediately contact the user. The current problem with the "red button" service is that it cannot be used outdoors. With the appropriate city infrastructure and a management platform, a new "red button" service could be deployed and administered by the same company that currently provides indoors protection. The new infrastructure could make it possible to extend the

protection area beyond the user's residence and could be operative when going out for walks, shopping, going to the doctor, to the library, etc.

In general, *all those who can easily get lost or disoriented* could be equipped with a sensor that, interacting with the city infrastructure, would allow the development of different services to monitor or find lost people. These people could also represent a moving node in a mesh network.

7. Security

Victim alerts: People under restraining orders due to, for instance, gender violence could be equipped with innovative security bracelets interacting with the city infrastructure. New services could be developed allowing victims to know the position or proximity of the subject affected by the restraining order.

Child protection: Small children could be equipped with geo-positioning bracelets that would interact with the city infrastructure. In case of loss, the bracelet would give the parents the exact position of the lost child. Also, an alert could be sent to the parents if the child moves further from an established threshold.

Stolen car tracking/positioning services: Cars with GPS features could be tracked/positioned using the city infrastructure. A service could be developed to send the exact position of a car to its owner in case the vehicle is stolen.

1.3.3 Bologna

The use case for Bologna is to implement single-sign-on for everybody that is linked to the Iperbole Wi-Fi network.

1.3.4 Genoa

The use case in Genoa is to drive more mobility in the city by providing information from their vehicle traffic system.

1.4 iCity Platform

The Architectural requirements of the iCity Platform (see picture below) are build on the input received from the cities.

The cities want to fully control and manage their existing systems and will provide access to the iCity Platform via an API.

Therefore, the implementation of an iCity Platform requires very few changes on their existing IT, organizational and operational structures; in fact, there is a need for the iCity Platform to integrate with those existing structures.

As the iCity APIs will be provided to the ecosystem of developers, we need to guarantee to them the end-to-end functionality of those APIs. This implies the implementation of a governance process. The iCity Platform needs to trust the services managed and provided through an API by the cities, but at the same time, the iCity Platform needs to monitor services that are not operating properly, even it they are not running in the iCity Platform.

Managing the APIs will be the main function of the iCity Platform.

The Web Services Gateway (WSG) functionality is about integrating applications without the complexity of a traditional ESB (Enterprise Service Bus).

One of the main tasks of an ESB is the support for message format transformations and protocol mediation. The iCity WSG, will include built-in support for message transformations to standards-based XML, with no application server dependencies like there is in ESB. Therefore, cities will not have to modify most of their existing code.

Another important function of the WSG will be to increase the security and compliance with regulatory requirements and perform the authorization and authentication functions.

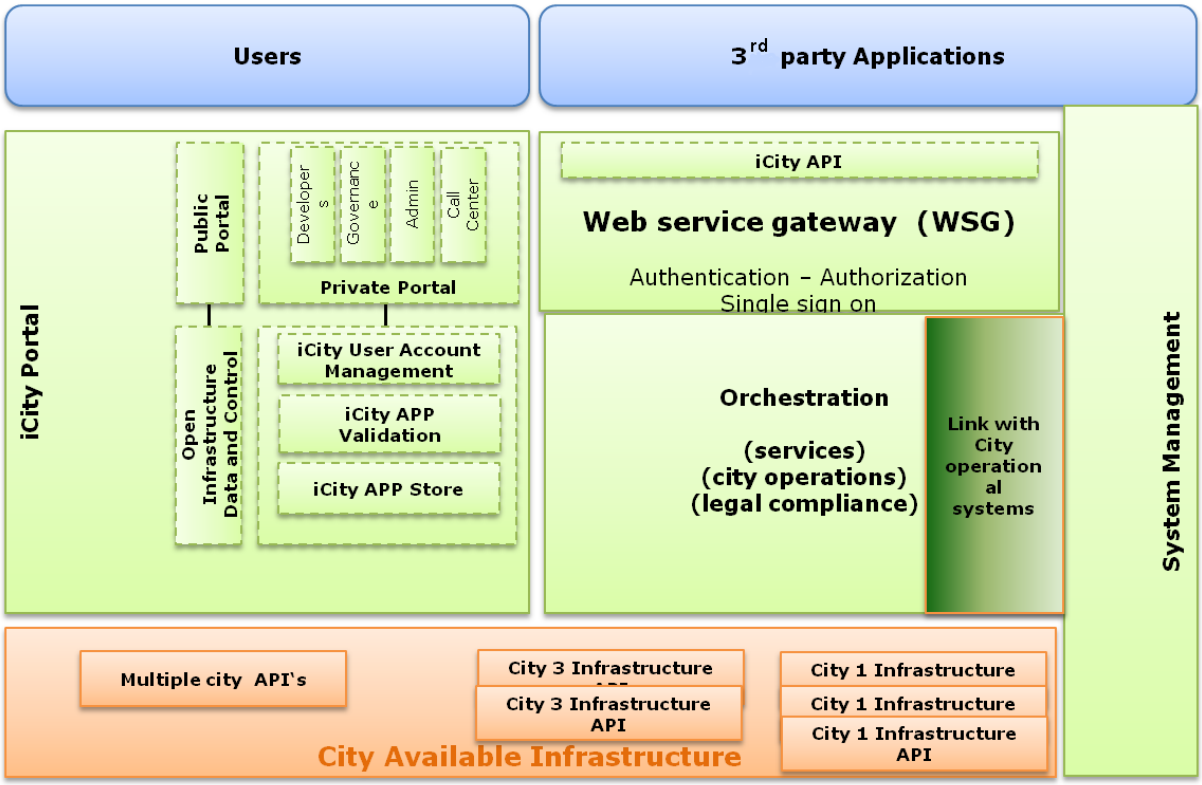


Figure 1: The iCity Platform Overview

The Orchestration function is also an important feature of the iCity Platform as it will be responsible for the orchestration of the business and operational processes.

For example, the iCity Platform needs to link the registration request from a developer, that wants to access certain APIs (see public portal-developers in the picture above) with the operational procedures of the city (see link with City operational system in picture above).

Some orchestration will involve manual actions, while other orchestration can be done automatically by the iCity Platform.

We have not yet decided where the iCity App Store should reside, but there is a preference to also make it part of the iCity Platform.

2. iCity pilot scenarios and use cases for London

This section presents the iCity Platform usage scenarios and use cases to identify specific characteristics and requirements of the iCity pilot for its deployment and usage in London.

2.1 Overview of services and data to be accessed through the iCity Platform

London wants to provide an innovative service to its customers on the basis of location data from mobile devices (more precisely Wi-Fi clients) monitored in the London Tube stations.

The mobile devices are standard Smartphones (iPhone, Blackberry, …) able to connect to a Wi-Fi network and the innovative service aims at providing information about the waiting times on the tube station i.e. how long passengers will have to wait to get on the tube at a particular station at a specific time.

The London tube network is equipped by Cisco network infrastructure able to collect the location data of all active Wi-Fi clients on London tube stations in a close to real-time mode.

The location data is used to compute user waiting times in a specific tube station, by the use of data modelling and specific analytics.

The Wi-Fi clients' location data is collected by Cisco's Mobility Services Engine (MSE) which supports an open API based on the Simple Object Access Protocol (SOAP) and XML.

This network infrastructure is managed by an Infrastructure Operator company.

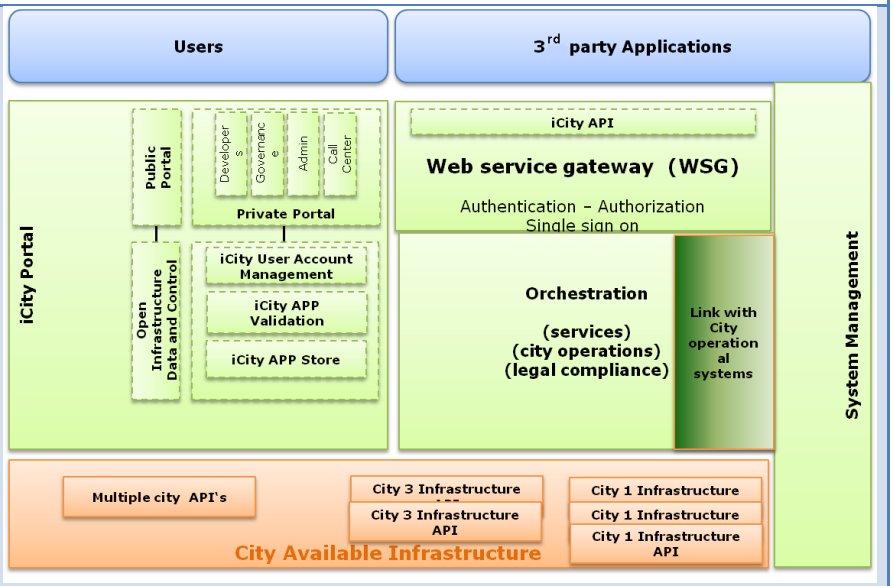
The iCity Platform obtains the location data from the MSE API, anonymizes it and makes it accessible for a certain type of iCity Platform users through a dedicated API.

A 3rd party developer obtains the anonymized Wi-Fi clients' location data from the iCity Platform and uses this data to provide an innovative service to its customers.

In the next paragraphs the scenarios are described.

2.2 iCity Platform as service gateway

Usage scenario	
US-London-1	**iCity Platform as service gateway**
Description	The Public Administration provides through the iCity Platform a restricted access to APIs of its informational services. Access is provided to the 3rd parties' applications for registered iCity Platform users, whose service subscription is approved in the iCity Platform by representatives of the Public Administration. The iCity Platform monitors the usage of the services and provides the data required for billing.

Category	**Organizational**
Domain	Public infrastructure services
Goals and purpose	This is a generic scenario demonstrating how the iCity Platform can be used for making the public informational services accessible for 3rd party applications. The scenario enables the iCity project to identify key technical, organisational and legal processes to be supported by the iCity Platform
Actors and Roles	Actors and their roles participating in the scenario, e.g., described using a table as follows: Actor — Roles Infrastructure API — City's infrastructure gateway, which can be accesses by the iCity Platform to obtain data or services iCity Platform — Platform providing access to electronic services of the city Client Application — Application consuming city infrastructure services through the iCity Platform on behalf of the registered iCity Platform user
Components and services required for execution, and proposed architecture	 A number of iCity components are required to realise the scenario: • iCity Portal - To manage the users of the iCity Platform including their privileges and service subscriptions - To publish the metadata of data and services provided through the iCity Platform - To publish open data documents

	• Metadata Registry – a catalogue of services provided by the iCity Platform and the open data documents published in the open data portal • Data Provision Service – service orchestrating other services of the iCIty platform in business processes and providing the iCity API to 3rd party applications – consumers of data/services • Infrastructure API – original source of data – an API providing an access for the iCity Platform to the city's electronic services and data
New specifications required between the actors	Infrastructure API specification, iCity API specification, iCity Metadata structure specification, Data structure specification, Service protocol specification
Related use cases	List of use cases related to this scenario: • UC-London-Org-1-1 • UC-London-Org-1-2

2.2.1 UC-London-Org-1-1 End-service Provider Registration in the iCity Platform

Organizational use case	
UC-London-Org-1-1	**End-service Provider Registration in the iCity Platform**
Description	The use case describes the process of registering a new user in the iCity Platform
Actors and roles	Actors and their roles participating in the use case, described using a table as follows: Actor – Roles Non-registered Person – A developer or a company willing to register in the iCity Platform and use its services iCity Platform – Platform providing access to electronic services of the city Platform Manager – A representative of the city administration managing the iCity Platform
Primary Actor	Non-registered person
Goals and aspirations for the	The main goal is to specify the process of registration of a new platform user

UC	
Platform, tools and the environment needed for execution of the UC	iCity Platform
Description of file formats, wire protocols, in-memory objects, and other artifacts needed for execution	None
Components and services required for execution	For implementation of the use case the following components are required: - iCity Platform Portal and in particular iCity User Account Manager
Available components	At the moment the only available component is the Open Data Platform, which user management has to be extended to implement identity management functionalities to be used by other platform components
Input parameters needed for initialization/ use case preconditions	None
Criteria for success	The successful process consists of the following steps: 1. Non-registered person visits the Web portal of the iCity Platform and submits a request for registration in the Platform 2. Platform Manager requests the list of registration requests in the iCity Portal (part of the iCity Platform), selects one of them and asks to present it details 3. iCity Platform shows the details of the request 4. Platform Manager validates the completeness of the provided data and approves the request in the iCity Platform 5. iCity Platform informs the Non-registered Person about the registration result
Failure conditions	Failure 1 (At step 4): the submitted data is incomplete or wrong Failure 2 (At step 4): The submitted data is complete, but the Platform Manager declines the request because of another reason
Failure handling	In Failure 1: Platform Manager with help of the platform requests Non-

	registered Person to submit missing - or to correct the provided - data In Failure 2: Platform Manager with help of the platform informs Non-registered Person that its request was rejected and explains the reason
Related use cases and those that are pre-requisite	None
Existing specifications to rely on	None

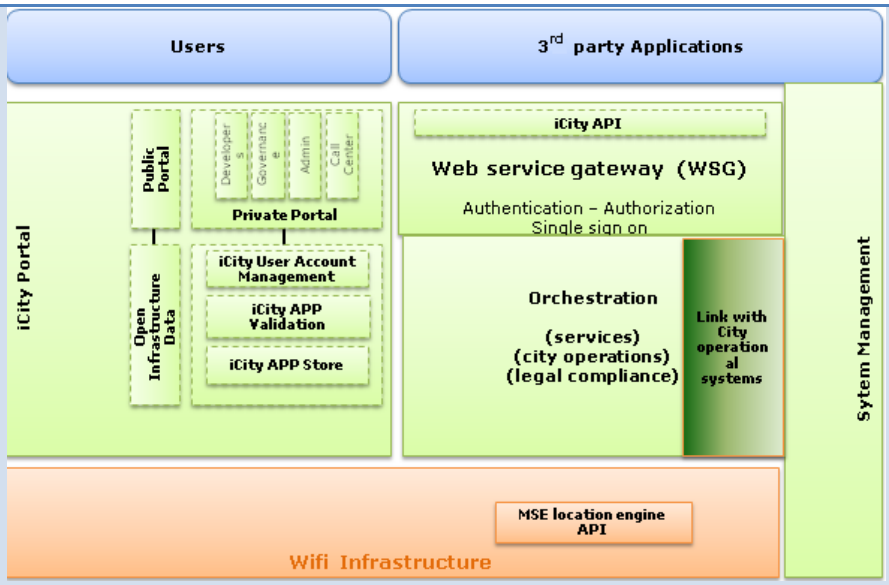
2.2.2 UC-London-Org-1-2: Subscribing the End-service Provider to an iCity Platform service

Organizational use case template	
UC-London-Org-1-2	**Subscribing an End-service Provider to an iCity Platform service**
Description	The use case describes the process of subscribing of an End-Service Provider to an iCity Platform service.
Actors and Roles	Actors and their roles participating in the scenario, e.g., described using a table as follows: Actor — Roles End-Service Provider — A developer or a company going to provide a service to its customers on the basis of iCity services iCity Platform — Platform providing access to electronic services of the city Platform Manager — A representative of the city administration managing the iCity Platform
Goals and aspirations for the UC	The goal of the use case is to define the process of subscribing of an End-Service Provider to an iCity Platform service
Organization domain	Administrative procedures
Regulations and policies to be taken into account	The current manual processes in the cities need to be implemented in the iCity Platform)
Description of organization procedures	1. End-Service Provider visits the portal of the iCity Platform and submits a request for an iCity Platform service. The request contains the data required for the service submission. That may include the data required for service payment if the iCity Platform

	service is provided on the commercial basis 2. Platform Manager requests the list of pending service subscription requests in the iCity Portal (part of the iCity Platform), selects one of them and asks to present it details. 3. iCity Platform shows the details of the request 4. Platform Manager validates the completeness of the provided data and approves the request in the iCity Platform 5. iCity Platform informs End-Service Provider about service subscription validation result
Components and services involved	iCity Platform (registry of iCity services in the iCity Portal, Component for management of incoming service subscription requests, Platform user management component)
Required preconditions	End-Service Provider is registered in the iCity Platform Registry of iCity services is freely accessible for the registered users in the iCity Portal
Criteria for success	End-Service Provider receives from the platform the credentials for accessing the requested platform service. End-Service Provider is registered in the platform as a consumer of its services
Failure conditions	Failure 1 (At step 4): the submitted data are incomplete or wrong Failure 2 (At step 4): The submitted data are complete, but Platform Manager declines the request because of other reason
Failure handling	In Failure 1: Platform Manager with help of the platform requests End-Service Provider to submit missing - or to correct the - provided data In Failure 2: Platform Manager with help of the platform informs End-Service Provider that its request was rejected and explains the reason
Related use cases and those that are pre-requisite	UC-London-Org-1-1 Technical use case is not defined for this organisational UC because of its simplicity
Existing specifications to rely on	No known specifications
New specifications required between the actors	None

2.3 Mobile Devices Location Service

Usage scenario	
US-London-2	**Mobile Devices Location Service**
Description	Company ABC wants to provide an innovative service to its customers on the basis of location data of mobile devices (more precisely Wi-Fi clients) monitored in London Tube. The London tube network is equipped by Cisco computer network infrastructure among different functionalities able to collect location data of all active Wi-Fi clients on London tube stations in a close to real-time mode. The Wi-Fi clients' location data can be published through an API of Cisco's Mobility Services Engine (MSE). This network infrastructure is managed by an Infrastructure Operator company. The iCity Platform obtains the location data from the MSE API, anonymizes it and makes it accessible for a certain type of iCity Platform users through a dedicated API. Company ABC is one of such iCity Platform users. It obtains the anonymized Wi-Fi clients' location data from the iCity Platform and uses these data to provide an innovative service to its customers.
Category	Technical, organizational
Domain	Public infrastructure services
Goals and purpose	The purpose of the scenario is to demonstrate the main underlying processes of the iCity Platform required to provide the restricted access to Wi-Fi clients' location data collected in the London Tube
Actors and Roles	Actors and their roles participating in the scenario, e.g., described using a table as follows: Actor — Roles MSE API — Detailed Wi-Fi clients location data provider iCity Platform — Anonymized Wi-Fi clients' location data provider. Added-value Service Provider — iCity Platform registered user Anonymized Wi-Fi clients location data consumer

Components and services required for execution, and proposed architecture	 A number of iCity components are required to realise the scenario: • iCity Portal - To manage the users of the iCity Platform including their privileges and service subscriptions. - To publish the metadata of data and services provided through the iCity Platform • Metadata Registry – a catalogue of services provided by the iCity Platform • iCity Data Storage – internal platform storage for historical data collected from the city infrastructure • Data Provision Service – service orchestrating other services of the iCIty platform in business processes and providing the iCity API to 3rd parties applications – consumers of data • MSE API – original source of data – an API providing data of location of mobile devices
New specifications required between the actors	MSE API specification, iCity API specification, iCity Metadata structure specification, Data structure specification
Related use cases	List of use cases related to this scenario: • UC-London-Technical-2-1

2.3.1 UC-London-Technical-2-1: Obtaining Mobile Devices' Location Data

Technical use case	
UC-London-Technical-2-1	**Obtaining Mobile Devices' Location Data**
Description	The use case describes the process of obtaining the mobile devices' location data from the iCity Platform
Actors and roles	Actors and their roles participating in the use case, described using a table as follows: Actor — Roles MSE API — Detailed Wi-Fi clients location data provider iCity Platform — Anonymized Wi-Fi clients' location data provider Added-value Service Provider — iCity Platform registered user; Anonymized Wi-Fi clients' location data consumer
Primary Actor	Added-value Service Provider
Goals and aspirations for the UC	The main goal is to specify main technical process of the iCIty Platform - obtaining, processing and forwarding data on request of the registered user
Platform, tools and the environment needed for execution of the UC	- Access to the MSE API - Deployed prototype of the iCity Platform able to obtain data from an MSE API
Description of file formats, wire protocols, in-memory objects, and other artifacts needed for execution	None
Components and services required for execution	The components and services of the system needed/used to realize the use case are presented above, in the corresponded section of the usage scenario US1
Available components	At the moment the only available component is the Open Data Platform, which user management has to be extended to implement identity management functionalities to be used by other platform components
Input parameters	It is assumed that the Added-value Service Provider is a registered

needed for initialization/ use case preconditions	user of the iCity Platform with access rights for the mobile devices location service
Criteria for success	The successful process consist of the following steps: 1. Added-value Service Provider requests mobile devices' location data for a period of time from the iCity Platform 2. iCity Platform authenticates Added-value Service Provider and validates its access rights for requested data 3. iCity Platform forwards the request to MSE API 4. MSE API returns the requested data 5. iCity Platform anonymizes the received location data 6. iCity Platform returns the anonymized data to the Added-value Service Provider
Failure conditions	Failure 1 (At step 2): authentication or access rights validation fails Failure 2 (At step 4): MSE API cannot return the requested data
Failure handling	On Failure 1: iCity Platform returns an authentication or authorization error to the Added-value Service Provider On Failure 2: MSE API returns an error. iCity Platform forwards the error to the Added-value Service Provider
Related use cases and those that are pre-requisite	none
Existing specifications to rely on	MSE API specification
New specifications required between the actors	iCity API specification

2.3.2 Technical specification of interfaces

The Cisco MSE provides the ability to track the physical location of Network Devices, both wired and wireless, using wireless LAN controllers (WLCs) and Cisco Aironet Lightweight Access Points (LAPs). This solution allows a customer to track any Wi-Fi device, including clients, active RFID tags, and rogue clients and Access Points.

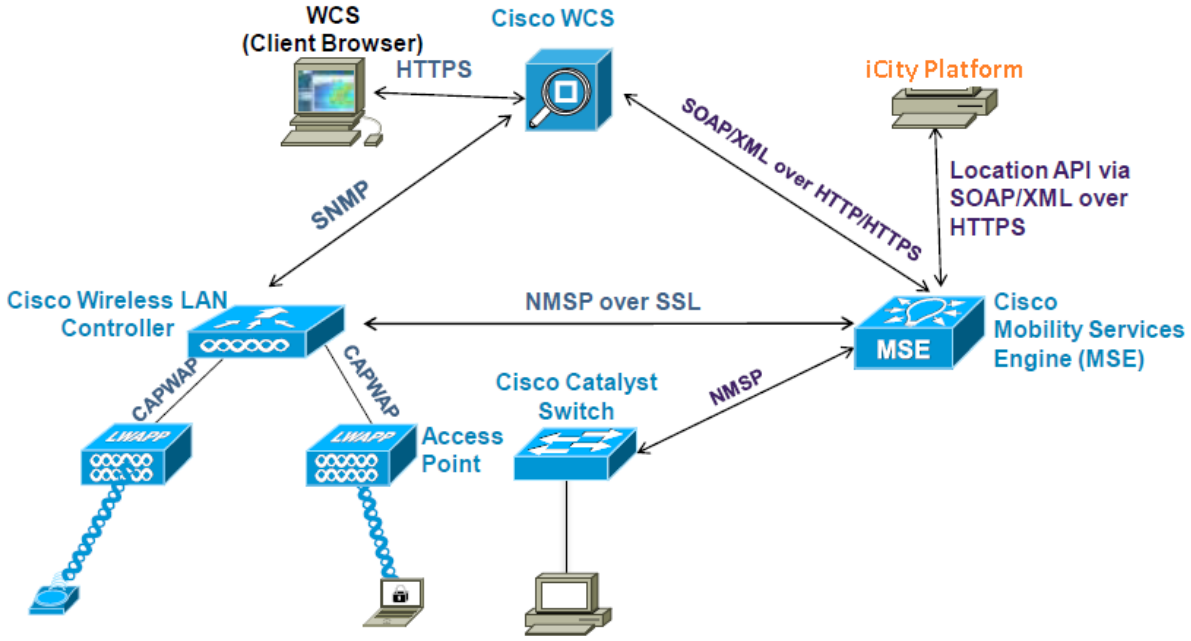


Figure 2: The Cisco MSE Environment

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Our goal is to make the API independent of the vendor; but the feasibility can only be determined once we have further technical information from the cities.

3. iCity pilot scenarios and use cases for Barcelona

The section presents iCity Platform usage scenarios and use cases to identify specific characteristics and requirements of the iCity for its deployment and usage in Barcelona.

3.1 Overview of services and data to be accessed through the iCity Platform

Barcelona City Council provides three types of infrastructures, which are described below.

Barcelona Wi-Fi Mesh is the Barcelona City Council Wi-Fi Access Points network spread across the whole city as the following picture shows.

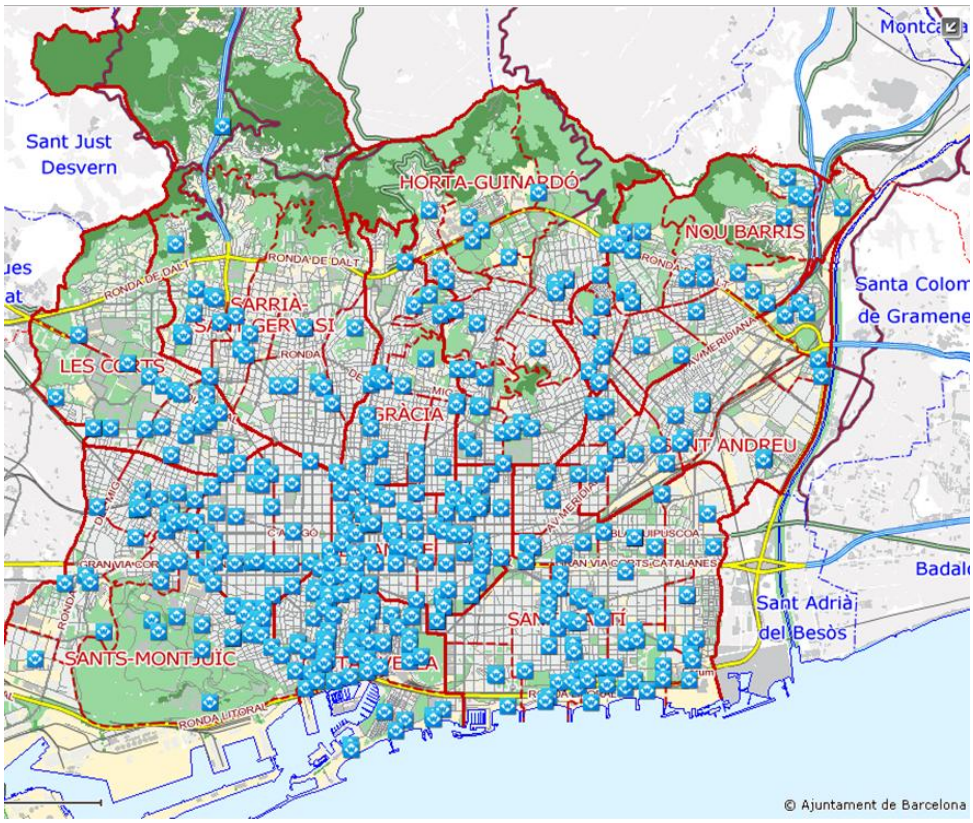


Figure 3: Barcelona Wi-Fi Access Points

The following use cases will use this infrastructure:

- BCN-US1-UC-Technical-1: Obtaining Mobile Devices' Location Data.
- BCN-US2-UC-Technical-1: Obtaining Mobile Devices' Location Data.

Barcelona is also equipped with a number of so-called "**Kiosks**", which are ATMs that allow electronic procedures related to administration of the City Council, and from where one can access information of municipal services in the city.

Figure 4: Barcelona Kiosks

Kiosks are installed mainly in Oficines d'Atenció al Ciutadà (OAC) but there are also other facilities such as libraries, civic centers or malls. Barcelona has about 50 kiosks around the city, as shown in the following image.

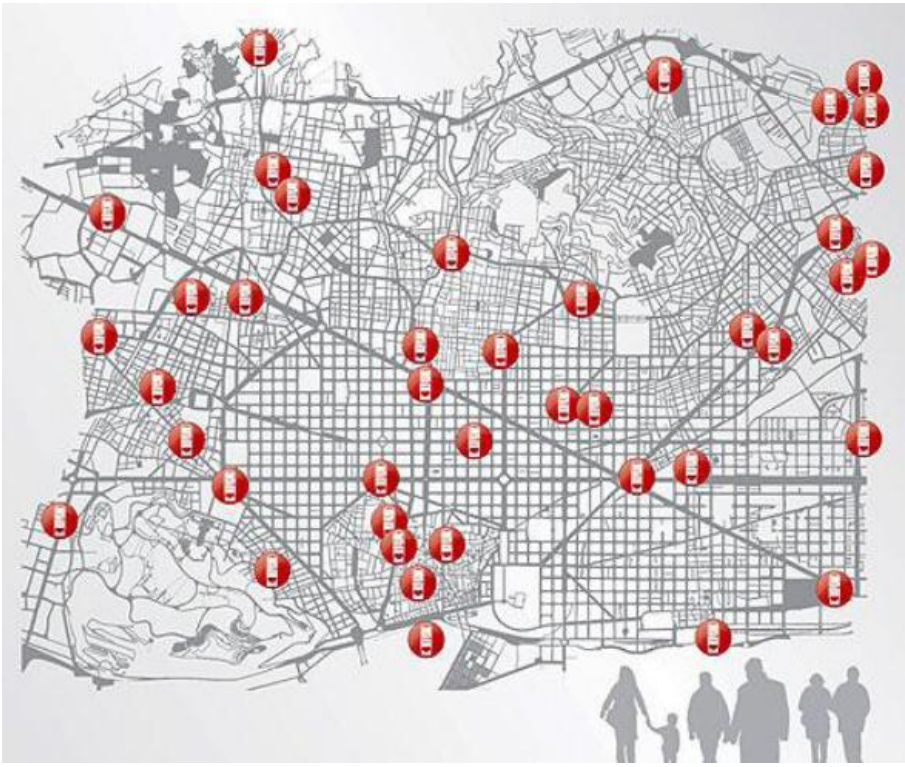


Figure 5: Location of the Barcelona Kiosks

The following use cases will use this infrastructure:

- BCN-US3-UC-Technical-1: Life Information.

- BCN-US4-UC-Technical-1: Obtaining Kiosks Data.
- BCN-US5-UC-Technical-1: Printing through eGovernment Kiosks.

Barcelona street bollards are an automatic control system for vehicle access allowing access to residents and those who work there, loading and unloading only, taxis, and emergency services. The system can be activated throughout the day or during times of increased activity in the area.

Access control is an electronic and mechanical system that consists of retractable bollards, traffic lights and a column for reading magnetic card access.

Figure 6: Barcelona Street Bollards

The following use cases will use this infrastructure:

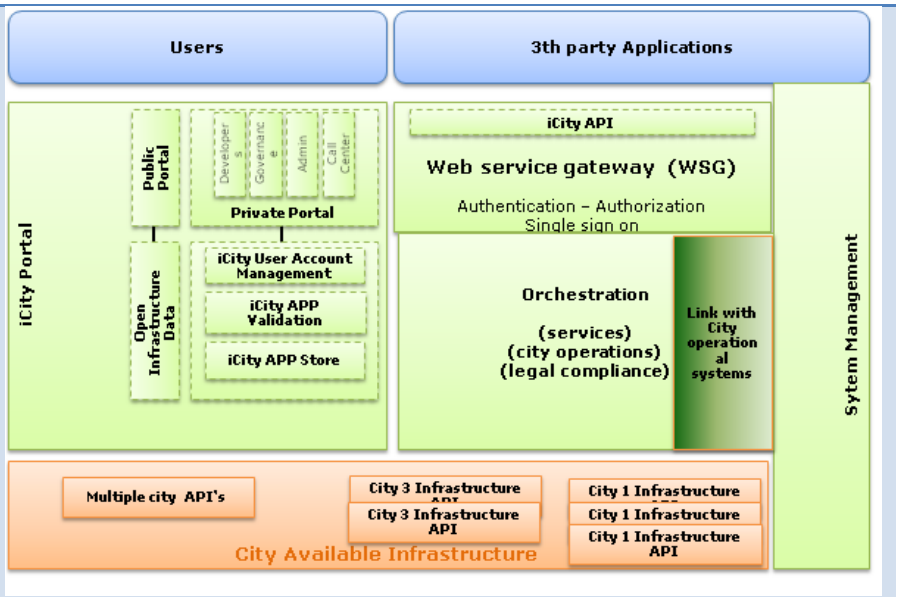
- BCN-US6-UC-Technical-1: Open/Close street bollards (for neighbours).
- BCN-US6-UC-Technical-2: Open/Close street bollards (for emergencies agents).

3.2 Mobile Devices Location Service

Usage scenario	
BCN-US1	**Mobile Devices Location Service**
Description	Company ABC wants to provide an innovative service to its customers on the basis of location data of mobile devices (more precisely Wi-Fi clients) monitored along the Barcelona seaside. One of the most crowded seaside areas in Barcelona is along the Passeig Marítim de la Barceloneta (from the W Hotel in the South, to the ARS Hotel in the North). This area will be equipped with Cisco computer network infrastructure having the functionality to collect the location data of all active Wi-Fi clients in a close to real-time mode. The proposed location of the deployment has been selected with the criteria of being a highly frequented pedestrian area and considering the beach as potential generator of high volume of wireless connections from tourists and general public visiting it. Considering the possibility of extending the infrastructure

	deployment to other city areas we suggest the possibility of including Passeig de Gracia as one of the historical commercial axis of Barcelona and a highly concurrent pedestrian area. Major activities there are related with high-end commerce, where the majority of the well known design and fashion stores are located. The axis proposed includes the east and west ends of the Passeig de Gracia avenue: from the Plaça Catalunya to the Casa Fuster hotel respectively. The Wi-Fi clients' location data can be published through an API of Cisco's Mobility Services Engine (MSE). This network infrastructure is managed by an Infrastructure Operator company. The iCity Platform obtains the location data from the MSE API, anonymizes it and makes it accessible for a certain types of iCity Platform users through a dedicated API. Company ABC is one of such iCIty Platform users. It obtains the anonymized Wi-Fi clients' location data from the iCity Platform and uses these data to provide an innovative service to its customers.
Category	**Technical**, **organizational**.
Domain	Public infrastructure services
Goals and purpose	The purpose of the scenario is to demonstrate the main underlying processes of the iCity Platform required to provide the restricted access to Wi-Fi clients' location data collected in the Barcelona seaside area
Actors and Roles	Actors and their roles participating in the scenario, e.g., described using a table as follows:

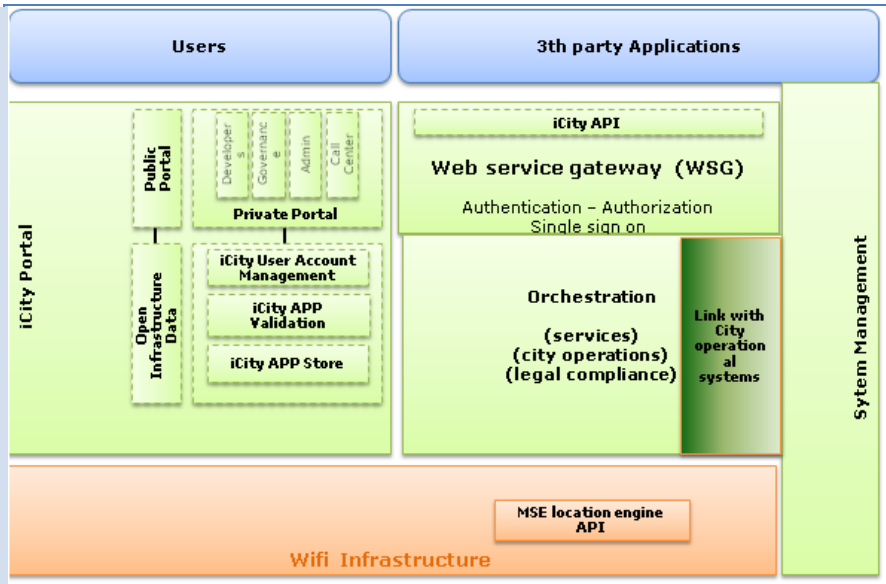
Actor	Roles
MSE API	Detailed Wi-Fi clients' location data provider
iCity Platform	Anonymized Wi-Fi clients' location data provider
Added-value Service Provider	iCity Platform registered user Anonymized Wi-Fi clients' location data consumer

Components and services required for execution, and proposed architecture	 A number of iCity components are required to realise the scenario: • iCity Tools Services: - This includes all the management services modules dedicated to the three platform targets: Managers, Applications Developers and End Users - All the services among other specific aspects they share an Authentication and Authorization Service that manages the privileges and roles for the whole platform • Data Provision Service – service orchestrating other services of the iCIty platform in business processes and providing the iCity API to 3rd parties applications – consumers of data • MSE API – original source of data – an API providing data about the location of mobile devices • iCity Management System includes: ○ Faults ○ Configuration ○ Accounting ○ Performance ○ Security
New specifications required between the actors	MSE API specification, iCity API specification, iCity Metadata structure specification, Data structure specification
Related use cases	List of use cases related to this scenario: • UC-London-Technical-2-1

3.3 City Mobile Devices Density

Usage scenario	
BCN-US2	**City Mobile Devices Density**
Description	Company ABC wants to provide an innovative service to its customers on the basis of mobile devices density (more precisely Wi-Fi clients) monitored in different locations around the whole Barcelona area. Barcelona Outdoor MESH Network Access Points are spread all over the city districts. By retrieving the number of devices connected at a time we can provide close to real-time information about number of users per access point (access points location is known). At the same time by using data coming from the captive portal the users are pointed when accessing the network the system can also provide other interesting data related to the device specifications such as web-browser or operating system used. This network infrastructure is managed by the Barcelona City Council. The iCity Platform obtains the data from the Barcelona Outdoor MESH Network management infrastructure, anonymizes it and makes it accessible for a certain type of iCity Platform users through a dedicated API. Company ABC is one of such iCity Platform users. It obtains the anonymized Wi-Fi clients' density and other related data from the iCity Platform and uses these data to provide an innovative service to its customers.
Category	Technical, organizational
Domain	Public infrastructure services
Goals and purpose	The purpose of the scenario is to demonstrate the main underlying processes of the iCity Platform when retrieving information from an existing service that was not designed for that purpose
Actors and Roles	Actors and their roles participating in the scenario, e.g., described using a table as follows:

Actor	Roles
Barcelona Outdoor MESH Network Access API	Detailed AP Wi-Fi clients' density data provider
iCity Platform	Anonymized Wi-Fi clients' density data provider
Added-value Service	iCity Platform registered users

	Provider	Anonymized Wi-Fi clients' density data consumer
Components and services required for execution, and proposed architecture	 A number of iCity components are required to realise the scenario: • iCity Portal - To manage the users of the iCity Platform including their privileges and service subscriptions. - To publish the metadata of data and services provided through the iCity Platform • Metadata Registry – a catalogue of services provided by the iCity Platform • iCity Data Storage – internal platform storage for historical data collected from the city infrastructure • Data Provision Service – service orchestrating other services of the iCIty Platform in business processes and providing the iCity API to 3rd parties applications – consumers of data • Barcelona Outdoor MESH Network Access API – original source of data – an API providing data about the location of mobile devices • iCity Management System includes: ○ Faults ○ Configuration ○ Accounting ○ Performance	

	○ Security
New specifications required between the actors	Barcelona Outdoor MESH Network Access API specification, iCity API specification, iCity Metadata structure specification, Data structure specification
Related use cases	List of use cases related to this scenario: • BCN-US2-UC-Technical-1

3.3.1 Use case 1: Obtaining Mobile Devices Density Data

Technical use case	
BCN-US2-UC-Technical-1	**Obtaining Mobile Devices' Density Data**
Description	The use case describes the process of obtaining the mobile devices density data from the iCity Platform.
Actors and roles	Actors and their roles participating in the use case, described using a table as follows: Actor: Barcelona Outdoor MESH Network Access API — Roles: Detailed AP Wi-Fi clients' density data provider Actor: iCity Platform — Roles: Anonymized Wi-Fi clients' density data provider Actor: Added-value Service Provider — Roles: iCity Platform registered users. Anonymized Wi-Fi clients' density data consumer
Primary Actor	Added-value Service Provider
Goals and aspirations for the UC	The main goal is to specify main technical process of the iCIty platform - obtaining, processing and forwarding data on request of the registered user
Platform, tools and the environment needed for execution of the UC	- Access to the Barcelona Outdoor MESH Network Access Management Service through its API - Deployed prototype of the iCity Platform able to obtain data from the Barcelona Outdoor MESH Network
Description of file formats, wire protocols, in-memory objects, and other artifacts needed for	None

execution	
Components and services required for execution	The components and services of the system needed/used to realize the use case are presented above, in the corresponded section of the usage scenario US2
Available components	Barcelona Outdoor MESH Network Access Points are spread all over the city districts. However an API to request data from its managing service is required
Input parameters needed for initialization / use case preconditions	It is assumed that Added-value Service Provider is a registered user of the iCity Platform with access rights for the mobile devices location service
Criteria for success	The successful process consist of the following steps: 1. Added-value Service Provider requests mobile devices density on a location for a period of time from the iCity Platform 2. iCity Platform authenticates the Added-value Service Provider and validates its access rights for requested data 3. iCity Platform forwards the request to the Barcelona Outdoor MESH Network API 4. MSE API returns the requested data 5. iCity Platform anonymizes the received location data. 6. iCity Platform returns the anonymized data to the Added-value Service Provider
Failure conditions	Failure 1 (At step 2): authentication or access rights validation fails Failure 2 (At step 4): MSE API cannot return the requested data
Failure handling	On Failure 1: iCity Platform returns an authentication or authorization error to Added-value Service Provider On Failure 2: Barcelona Outdoor MESH Network API returns an error. iCity Platform forwards the error to Added-value Service Provider
Related use cases and those that are pre-requisite	Relevant use cases for the associated usage scenario
Existing specifications to rely on	-
New specifications required between the actors	iCity API specification

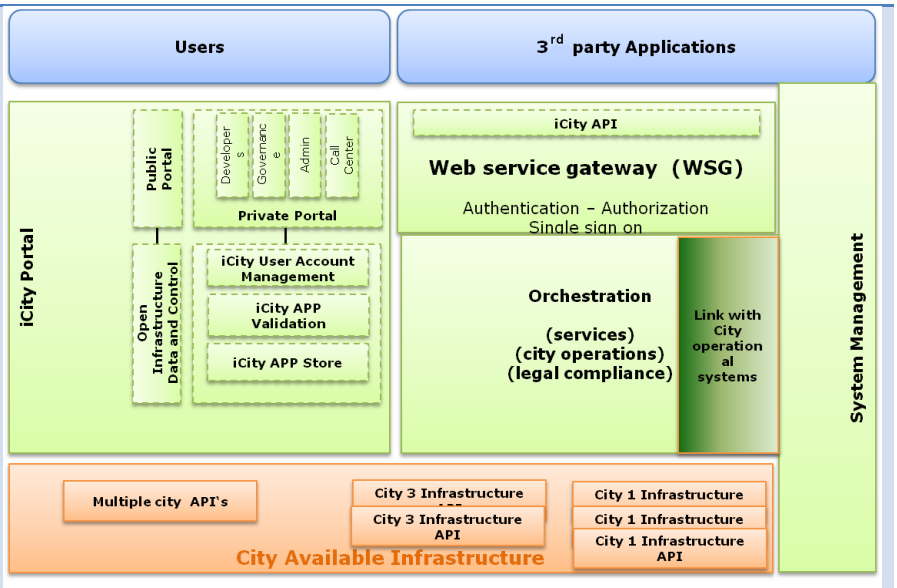
3.4 Kiosks Service

The section describes the usage scenario. The sub-sections present the relevant for the scenario use cases.

Usage scenario	
BCN-US3	**Kiosks service**
Description	Barcelona City Council has about 50 kiosks across the city in order to make e-procedures easier. They are placed in municipality buildings, shopping areas, libraries, etc... Company ABC wants to display information in the screen, when the kiosk is not being used. The data will be selected according to the environment of the kiosk, this means that kiosk will get information about sensors near to the kiosk, and according to this will display an event or alert or advertisement.
Category	Technical.
Domain	Public infrastructure services
Goals and purpose	The purpose of the scenario is to demonstrate the main underlying processes of the iCity Platform required to provide access to the Kiosk API, so that developers can create applications and the Barcelona City Council can validate it. Finally, these applications will be published in the Kiosks that are located in the main buildings and streets of the Barcelona City
Actors and Roles	Actors and their roles participating in the scenario, e.g., described using a table as follows:

Actor	Roles
Developer	End User of iCity API
Governance	End Users of the City Council, who validate the Apps created by the developers
Admin	Technical administration of the portal
Call Center	Inbound call receivers who help iCity Users to solve their incidents

Components and services required for execution, and proposed architecture



A number of iCity components are required to realise the scenario:

- iCity Portal
  - To manage the users of the iCity Platform including their privileges and service subscriptions
  - To publish the metadata of data and services provided through the iCity Platform
  - To validate Apps created by developers
  - To registry incidents of iCity Platform tools
- Data Provision Service – service orchestrating other services of the iCity Platform in business processes and providing the iCity API to 3rd parties applications – consumers of data
- iCity API – Provide a standard language to the iCity Platform
- KIOSK API – original source of data – an API providing data
- iCity Management System includes:
  - Faults
  - Configuration
  - Accounting
  - Performance
  - Security

New specifications required between the actors

Kiosk API specification, iCity API specification, iCity Metadata structure specification, Data structure specification, network

	requirements
Related use cases	List of use cases related to this scenario: • UC-London-Org-1-1 • UC-London-Technical-1-1 • BCN-US3-UC-Technical-1

3.4.1 Use case 1: Live Information

Technical use case	
BCN-US3-UC-Technical-1	**Live Information**
Description	The use case describes the process of obtaining the information of the iCity Platform API that will be linked with developer application.
Actors and roles	Actors and their roles participating in the use case, described using a table as follows: Actor — Roles Developer — End User of iCity API Governance — End Users of the City Council, who validate the Apps created by the developers Admin — Technical administration of the portal Call Center — Inbound call receivers who help iCity Users to solve their incidents
Primary Actor	Added-value a Kiosk device
Goals and aspirations for the UC	The main goal is to specify main technical process of the iCIty platform - obtaining, processing and forwarding data on request of the registered user
Platform, tools and the environment needed for execution of the UC	- Allow the access to the Kiosk API - Deployed prototype of the iCity Platform able to obtain data about the environment of Kiosks and select different information to display
Description of file formats, wire protocols, in-memory objects, and other artefacts needed for execution	“Artifacts” used in the use case

Components and services required for execution	The components and services of the system needed/used to realize the use case are presented above, in the corresponded section of the usage scenario
Available components	At the moment, the only available component is the Open Data Platform, which user management has to be extended to implement identity management functionalities to be used by other platform components
Input parameters needed for initialization / use case preconditions	It is assumed that we have data in iCity Platform about the environment close to the Kiosks
Criteria for success	The successful process consist of the following steps: 1. iCity Platform allows authentication of access rights to the developers 2. iCity Platform forwards the request to Kiosk API 3. Kiosk API returns the requested data 4. iCity Platform API returns data about the environment close to the Kiosks
Failure conditions	Failure 1 (At step 1): authentication or access rights validation fails Failure 2 (At step 3): Kiosk API cannot return the requested data Failure 3 (At step 4): iCity Platform API cannot return the requested data
Failure handling	On Failure 1: iCity Platform returns an authentication or authorization error On Failure 2: Kiosk API returns an error. iCity Platform forwards the error to IMI On Failure 3: ICity Platform API returns an error. iCity Platform forwards the error to Management System
Related use cases and those that are pre-requisite	Relevant use cases for the associated usage scenario
Existing specifications to rely on	Kiosk API specification
New specifications required between the actors	iCity API specification

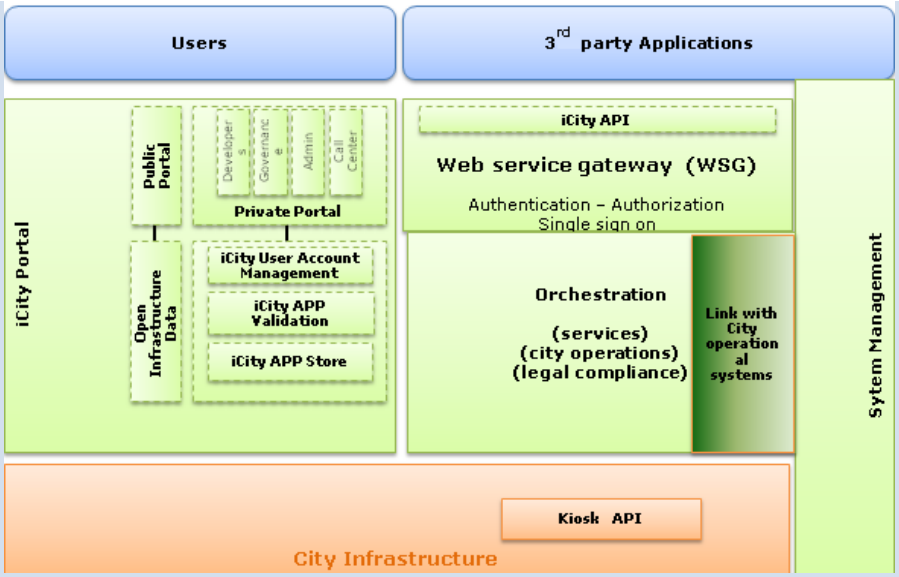
3.5 Kiosks Data

The section describes the usage scenario. The sub-sections present the relevant for the scenario use cases.

Usage scenario	
BCN-US4	**Kiosks Data**
Description	Barcelona City Council has about 50 kiosks across the city in order to make e-procedures easier. They are placed in municipality buildings, shopping areas, libraries, etc... Company ABC wants to display information in the screen, when the kiosk is not being used. The data will be selected according to the environment of the kiosk, this means that kiosk will get information about sensors near to the Kiosk, and according to this will display an event or alert or advertisement.
Category	Technical
Domain	Public infrastructure services
Goals and purpose	The purpose of the scenario is to demonstrate the main underlying processes of the iCity Platform required to provide access to the Kiosk API, so users can access to data allocated in the iCity Platform and also in other places, like Kiosks
Actors and Roles	Actors and their roles participating in the scenario, e.g., described using a table as follows:

Actor	Roles
Developer	End User of iCity API and Kiosk API
Admin	Technical administration of the portal
Call Center	Inbound call receivers who help iCity Users to solve their incidents

Components and services required for execution, and proposed architecture



- iCity Portal
  - To manage the users of the iCity Platform including their privileges and service subscriptions
  - To publish the metadata of data and services provided through the iCity Platform
  - To validate Apps created by developers
  - To registry incidents of iCity Platform tools
- Data Provision Service – service orchestrating other services of the iCity Platform in business processes and providing the iCity API to 3rd parties applications – consumers of data
- iCity API – Provide a standard language to iCity Platform
- KIOSK API – original source of data – an API providing data
- iCity Management System includes:
  - Faults
  - Configuration
  - Accounting
  - Performance
  - Security

New specifications required between the actors

Kiosk API specification, iCity API specification, iCity Metadata structure specification, Data structure specification, network requirements

Related use cases

List of use cases related to this scenario:

BCN-US4-UC-Technical-1

3.5.1 Use case 1: Obtaining Kiosks Data

Technical use case	
BCN-US4-UC-Technical-1	**Obtaining Kiosks Data**
Description	The use case describes the process of obtaining the information of the iCity Platform API and Kiosk API.
Actors and roles	Actors and their roles participating in the use case, described using a table as follows: Actor — **Roles** Developer — End User of iCity API and Kiosk API Admin — Technical administration of the portal Call Center — Inbound call receivers who help iCity Users to solve their incidents
Primary Actor	Added-value a Kiosk device
Goals and aspirations for the UC	The main goal is to specify main technical process of the iCIty platform - obtaining, processing and forwarding data on request of the registered user
Platform, tools and the environment needed for execution of the UC	- Allow the access to the Kiosk API - Deployed prototype of the iCity Platform able to obtain data about the environment of Kiosks and the iCity Platform
Description of file formats, wire protocols, in-memory objects, and other artefacts needed for execution	None
Components and services required for execution	The components and services of the system needed/used to realize the use case are presented above, in the corresponded section of the usage scenario
Available components	At the moment the only available component is the Open Data Platform, which user management has to be extended to implement identity management functionalities to be used by other platform components
Input parameters needed for initialization / use	It is assumed that we have data in the iCity Platform about the environment close to the Kiosks

case preconditions	
Criteria for success	The successful process consist of the following steps: 1. iCity Platform allows authentication of access rights to developers 2. iCity Platform forwards the request to the Kiosk API 3. Kiosk API returns the requested data 4. iCity Platform API returns data about the environment close to the Kiosks
Failure conditions	Failure 1 (At step 1): authentication or access rights validation fails Failure 2 (At step 3): Kiosk API cannot return the requested data Failure 3 (At step 4): iCity Platform API cannot return the requested data
Failure handling	On Failure 1: iCity Platform returns an authentication or authorization error On Failure 2: Kiosk API returns an error. iCity Platform forwards the error to IMI On Failure 3: ICity Platform API returns an error. iCity Platform forwards the error to Management System
Related use cases and those that are pre-requisite	Relevant use cases for the associated usage scenario
Existing specifications to rely on	Kiosk API specification
New specifications required between the actors	iCity API specification

3.6 eGovernment Kiosks

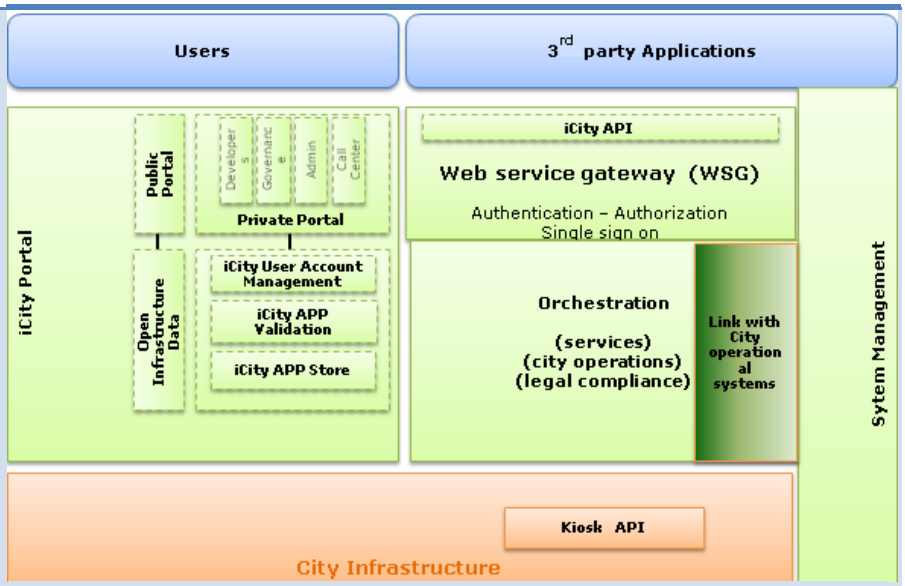
The section describes the usage scenario. The sub-sections present the relevant for the scenario use cases.

Usage scenario	
BCN-US5	**eGovernment Kiosks**
Description	Barcelona City Council has about 50 kiosks across the city in order to make e-procedures easier.

	They are placed in municipality buildings, shopping areas, libraries, etc... ACME Company wants to provide services using the devices available in the eGov Kiosks: Geopositioning, printing, citizen authentication, barcode reading, billing, ticket printing.
Category	Technical, organizational
Domain	Public interest services
Goals and purpose	The purpose of the scenario is to demonstrate the main underlying processes of the iCity Platform required to provide a controlled access to eGovernment Kiosks functionalities
Actors and Roles	Actors and their roles participating in the scenario, e.g., described using a table as follows:

Actor	Roles
eGov Kiosks Manager	Establish the limits of the action framework (who, how, when, how much, and why you can access to kiosks)
eGov Kiosks Platform Technical Manager	Technical administration of the platform

Components and services required for execution, and proposed architecture



- iCity Portal
  - To manage the users of the iCity Platform including their privileges and service subscriptions
  - To publish the metadata of data and services provided through the iCity Platform
  - To validate Apps created by developers

	- To registry incidents of iCity Platform tools
	• Data Provision Service – service orchestrating other services of the iCity Platform in business processes and providing the iCity API to 3rd parties applications – consumers of data
	• iCity API – Provide a standard language to iCity Platform
	• KIOSK API – original source of data – an API providing data
	• iCity Management System includes:
	  ○ Faults
	  ○ Configuration
	  ○ Accounting
	  ○ Performance
	  ○ Security

New specifications required between the actors	iCity API specification, iCity Metadata structure specification
Related use cases	List of use cases related to this scenario: • BCN-US5-UC-Technical-1: Printing through eGovernment Kiosks

3.6.1 Use case 1: Printing through eGovernment Kiosks

Technical use case	
BCN-US5-UC-Technical-1	**Printing through eGovernment Kiosks**
Description	The use case describes the process of offering printing services through eGovernment Kiosks. The ACME Company offers a service that permits print a document sent to a specific e-mail address for each kiosk, (maximum 3 pages and B/W). For instance, to print a boarding pass. This should be a paying service.
Actors and roles	Actors and their roles participating in the use case, described using a table as follows:

	Actor	Roles
	Citizen	End-user
	iCity Platform	Access between app and eGovernment Kiosks Platform
	Added-value Service Provider	iCity Platform registered user App development, offers the service to the end-user (including billing)
	Barcelona City Representative	Supervision of the opening of the infrastructure Approval of the application. Management of billing the developer (if applicable)
Primary Actor	Added-value Service Provider	
Goals and aspirations for the UC	The main goal is to specify the main technical process of the iCIty platform Application approval (by the cities). Application catalogue Communication and governance between apps and infrastructures platform Billing (if applicable)	
Components and services required for execution	Access to the Kiosks Standard Protocol (API) Billing component Governance components	
Regulations and policies to be taken into account	Beware of personal data involved	
Required preconditions		
Criteria for success	The successful process consists of the following steps: • Added-value Service Provider requests access to eGov Kiosks Platform for a specific event (to print) through the iCity Platform • iCity Platform authenticates Added-value Service Provider and validates its access rights for requested petition • The specific kiosk prints the document (if it is not available sends an alert) • iCity Platform manages accounting of this petition and manages alerts	

Failure conditions	
Failure handling	
Related use cases and those that are pre-requisite	None
Existing specifications to rely on	eGovernment Kiosks API
New specifications required between the actors	eGovernment Kiosks API

3.7 Street Bollards

The section describes the usage scenario. The sub-sections present the relevant for the scenario use cases.

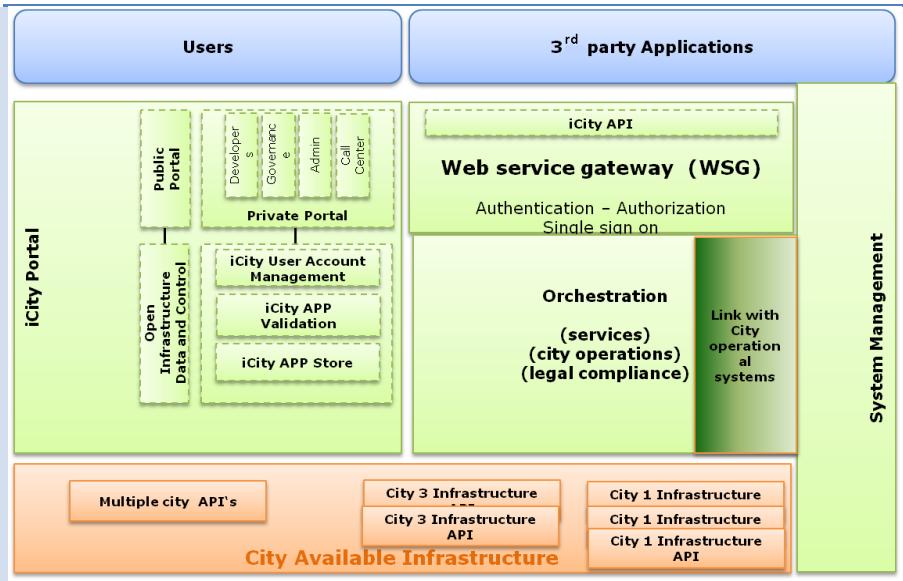
Usage scenario	
BCN-US6	**Street Bollards**
Description	Barcelona City Council has about 100 street bollards across the city in order to open/close the traffic in specific streets (especially in the streets of Ciutat Vella, the Old Town). The access control of these streets bollards for neighbours is now done by card, remote control or fixed schedule. ACME Company wants to provide a service using mobile phones in order to open/close the street bollards.
Category	Technical, organizational
Domain	Public interest services
Goals and purpose	The purpose of the scenario is to demonstrate the main underlying processes of the iCity Platform required to provide a controlled access in order to open/close street bollards

Actors and Roles	Actors and their roles participating in the scenario, e.g., described using a table as follows:

Actor	Roles
Street Bollards Manager	Establish the limits of the action framework (who, how, when, how much, and why you can open/close street

		bollards)
	Street Bollards Platform Technical Manager	Technical administration of the platform

Components and services required for execution, and proposed architecture



- iCity Portal
  - To manage the users of the iCity Platform including their privileges and service subscriptions
  - To publish the metadata of data and services provided through the iCity Platform
  - To validate Apps created by developers
  - To registry incidents of iCity Platform tools
- Data Provision Service – service orchestrating other services of the iCity Platform in business processes and providing the iCity API to 3rd parties applications – consumers of data
- iCity API – Provide a standard language to the iCity Platform.
- KIOSK API – original source of data – an API providing data
- iCity Management System includes:
  - Faults
  - Configuration
  - Accounting
  - Performance

	○ Security
New specifications required between the actors	iCity API specification, iCity Metadata structure specification
Related use cases	List of use cases related to this scenario: • BCN-US6-UC-Technical-1: Open/Close street bollards (for neighbours) • BCN-US6-UC-Technical-2: Open/Close street bollards (for emergencies agents)

3.7.1 Use case 1: Open/Close street bollards (for neighbours)

Technical use case	
BCN-US6-UC-Technical-1	**Open/Close street bollards (for neighbours)**
Description	The use case describes the process of offering a service in order to open/close street bollards for neighbours. The ACME Company offers a service that permits a neighbour to open/close street bollards (in his/her residence are). These actions depend on usage policies assigned by Street Bollards Manager (Barcelona City Council).
Actors and roles	Actors and their roles participating in the use case, described using a table as follows:

Actor	Roles
Citizen	End-user
iCity Platform	Access between app and Street Bollards Platform
Added-value Service Provider	iCity Platform registered user App development, offers the service to the end-user
Call Center	Manages service issues
Barcelona City Representative	Supervision of the opening of the infrastructure Approval of the application Management of billing the developer (if applicable)

Primary Actor	Added-value Service Provider

Goals and aspirations for the UC	The main goal is to specify main technical process of the iCIty Platform Application approval (by the cities). Application catalogue Communication and governance between apps and infrastructures platform. Billing (if applicable)
Components and services required for execution	Access to the Street Bollards Protocol (API) Billing component Governance components
Regulations and policies to be taken into account	Beware of personal data involved, (including data from Registration Office)
Required preconditions	Not currently known
Criteria for success	The successful process consist of the following steps: 1. Added-value Service Provider requests access to Street Bollards Platform for a specific event (open/close) through the iCity Platform 2. iCity Platform authenticates Added-value Service Provider and validates its access rights for requested petition 3. The specific street bollard opens/closes (if it is not available sends an alert) 4. iCity Platform manages accounting of this petition and manages alerts
Failure conditions	Failure 1 (At step 2): authentication or access rights validation fails
Failure handling	On Failure 1: iCity Platform returns an authentication or authorization error to Added-value Service Provider
Related use cases and those that are pre-requisite	Related to BCN-US2-UC-Technical-2 use case
Existing specifications to rely on	Street Bollards API
New specifications required between the actors	Street Bollards API

3.7.2 Use case 2: Open/Close street bollards (for emergencies agents)

Technical use case	
BCN-US6-UC-Technical-2	**Open/Close street bollards (for emergencies agents)**
Description	The use case describes the process of offering a service in order to open/close street bollards for emergencies agents (police, fire, health services, etc). The ACME Company offers a service that permits an emergency agent to open/close street bollards (in his/her residence are). These actions depend on usage policies assigned by Street Bollards Manager (Barcelona City Council). But, in this case, the usage policies are less restrictive than the previous case, (the neighbour's case).
Actors and roles	Actors and their roles participating in the use case, described using a table as follows:

Actor	Roles
Emergency agent	End-user
iCity Platform	Access between the app and the Street Bollards Platform
Added-value Service Provider	iCity Platform registered user App development, offers the service to the end-user It could be a department of Barcelona City Council
Call Center	Manages service issues. In this case the answer must be the fastest possible
Barcelona City Representative	Supervision of the opening of the infrastructure Approval of the application

Primary Actor	Added-value Service Provider
Goals and aspirations for the UC	The main goal is to specify main technical process of the iCIty platform Application approval (by the cities). Application catalogue Communication and governance between the apps and the infrastructures platform
Components and services required	Access to the Street Bollards Protocol (API)

for execution	Governance components
Regulations and policies to be taken into account	This is an emergency case, so the response to any incidents is critical
Required preconditions	Not currently known
Criteria for success	The successful process consist of the following steps: 1. Added-value Service Provider requests access to Street Bollards Platform for a specific event (open/close) through the iCity Platform 2. iCity Platform authenticates Added-value Service Provider and validates its access rights for the requested petition 3. The specific Street Bollard opens/closes (if it is not available sends an alert) 4. iCity Platform manages accounting of this petition and manages alerts
Failure conditions	Failure 1 (At step 2): authentication or access rights validation fails
Failure handling	On Failure 1: iCity Platform returns an authentication or authorization error to Added-value Service Provider
Related use cases and those that are pre-requisite	Related to BCN-US2-UC-Technical-1 use case
Existing specifications to rely on	Street Bollards API
New specifications required between the actors	Street Bollards API

3.8 Technical specification of interfaces

The technical specification of the Cisco MSE is explained in chapter 2.3.2 of deliverable D3.1.

4. iCity pilot scenarios and use cases for Genoa

The section presents iCity Platform usage scenarios and use cases to identify specific characteristics and requirements of the iCity for its deployment and usage in Genoa.

4.1 Overview of services and data to be accessed through the iCity Platform

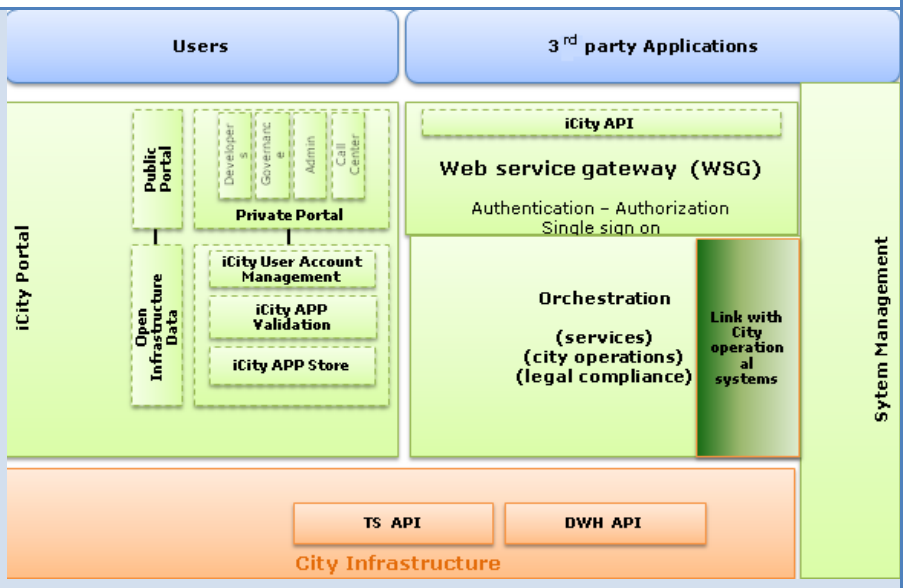
4.2 Infomobility Data

The municipality of Genoa provides an infrastructure composed of sensors and webcams capable of generating real-time alerts about urban-traffic and highway-access to the city, as well as data on the availability of places in public car parks. The infrastructure is described below.

Usage scenario	
Genoa-US1	**Infomobility Data**
Description	Company ABC wants to provide an innovative service to its customers on the basis of the data of urban-traffic provided by sensors placed at strategic points of the city. The municipality of Genoa is equipped with a monitoring centre traffic named “TRAFFIC’S SUPERVISOR” (named hereafter:TS), able to collect real-time data coming from sensors located throughout the territory. The urban-traffic data can be collected and published on an open-data platform in order to be accessible for a certain type of iCity Platform users, through a dedicated API of “TRAFFIC’s SUPERVISOR”. Company ABC is one of such iCIty Platform users. It obtains the Urban-traffic data from the iCity Platform and uses these data to provide an innovative service to its customers. The realisation of the scenario will bring significant improvement of the open data accessibility by adding infrastructure capabilities in order to rise the opportunities for iCity stakeholders, and potential impacts in term of an increase in 3rd party application development.
Category	Technical, organizational
Domain	Public services
Goals and purpose	The purpose of the scenario is to demonstrate the main underlying processes of the iCity Platform required to provide access to the data collected by the TS
Actors and Roles	Actors and their roles participating in the scenario, e.g., described using a table as follows:

	Actor	Roles
	TS API	Detailed real time traffic-data provider
	iCity Platform	Controlled access to traffic data via API
	Platform manager	City authority managing access
	Added-value Service Provider	3rd party developer
	Citizen	Consumer of service

Components and services required for execution, and proposed architecture



A number of iCity components are required to realise the scenario:

- iCity Portal
  - To manage the users of the iCity Platform including their privileges and service subscriptions
  - To publish the metadata of data and services provided through the iCity Platform
- Metadata Registry – a catalogue of services provided by the iCity Platform
- iCity Data Storage – internal platform storage for historical data collected from the city infrastructure
- Data Provision Service – service orchestrating other services of the iCIty platform in business processes and providing the iCity API to 3rd parties applications – consumers of data
- TSI API – original source of data – an API providing real-

	time traffic-data • DWH API – original source of data – an API providing historical data from the Data warehousing infrastructure
New specifications required between the actors	TS API specification, DWH specification, iCity API specification, iCity Metadata structure specification, Data structure specification
Related use cases	List of use cases related to this scenario: • Will be added if feedback is received from the development community

4.2.1 Use case 1: Delivery Express Support – (Version 1.0)

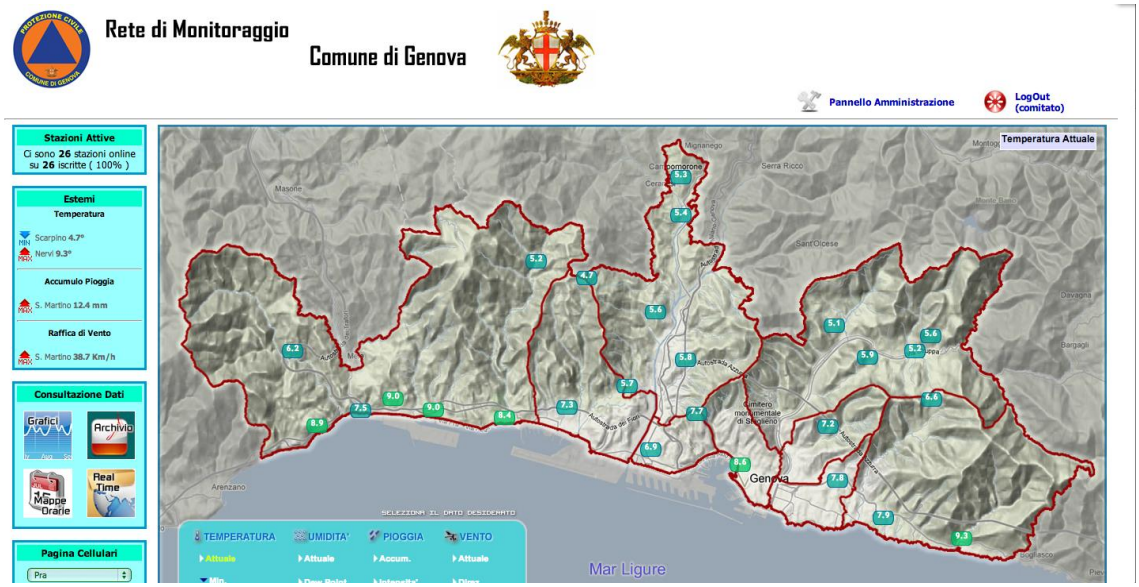
Technical use case	
Genoa-US1-UC1-Technical	**Obtaining real time Traffic Data**
Description	The use case describes the process of obtaining real-time traffic-data from the iCity Platform.
Actors and roles	Actors and their roles participating in the use case, described using a table as follows: Actor — Roles TS API — Real time traffic data provider iCity Platform — Provider of traffic data API Added-value Service Provider — 3rd party developer Citizen — Real Time traffic-data consumer
Primary Actor	Added-value Service Provider
Goals and aspirations for the UC	The main goal is to specify main technical process of the iCIty platform - obtaining, processing and forwarding data on request of the registered user
Platform, tools and the environment needed for execution of the UC	Access to the TS API Deployed prototype of the iCity Platform able to obtain data from an TS API
Description of file formats, wire protocols, in-memory objects, and other artifacts needed for execution	REST and JSON Info on TS is provided in this section below

Components and services required for execution	The components and services of the system needed/used to realize the use case are presented above, in the corresponded section of the usage scenario US1
Available components	At the moment the available component is the Traffic Supervisor Platform and the Info-Mobility portal which user management has to be extended to implement identity management functionalities to be used by other platform components
Input parameters needed for initialization / use case preconditions	None
Criteria for success	The successful process consist of the following steps: 1. Added-value Service Provider requests access to real time Traffic Data through the iCity Platform 2. iCity Platform authenticates Added-value Service Provider and validates its access rights for obtaining the data 3. iCity Platform obtains the data from TS API and forwards them to the Added-value Service Provider 4. Added-value Service Provider obtains the requested data
Failure conditions	Failure 1 (in step 1): authentication or access rights validation fails Failure 2 (in step 3) : TS API cannot return the requested data
Failure handling	On Failure 1: iCity Platform returns an authentication or authorization error to Added-value Service Provider On Failure 2: TS API returns an error. iCity Platform forwards the error to Added-value Service Provider
Related use cases and those that are pre-requisite	Relevant use cases for the associated usage scenario: • none
Existing specifications to rely on	DWH Specifications Traffic-Supervisor Specifications
New specifications required between the actors	iCity API specification

4.3 Environment

The Weather Station System developed in collaboration with Civil protection can export a series of detailed informations about the temperature, the humidity level, and weather in general, for more than twenty areas of the Municipality.

The Weather Station is based on a server side scripting language (PHP) in order to produce data. The platform is composed by a Web server with a PHP processor module which generates the resulting Web page. The platform's scripts act as filters taking inputs from a series of parameters and outputting another stream of data. The output will be HTML or WAP. The data are updated every five minutes.



The infrastructure is used exclusively by Civil Protection Department.

The security system is integrated in the application through an AAA module.

Authorized users can access the application after having logged into the domain of the Municipality managed through Active Directory.

Data model

Name	Measure Unit	Description
Temperatura:	°C	Temperature
Umidità:	%	Humidity
Vento:	km/h da	Wind
Vento medio:	km/h	Average wind
Pioggia giorno:	mm	Rain day
Rain Rate:	mm/h	Rain Rate
Dew point :	°C	Dew point

Pressione:	hPa	Pressure
Temp minima:	°C	Minimum Temperature
Temp massima:	°C	Max Temperature
Raffica max:	km/h	Max Wind Speed
Rain rate max:	mm/h	Max Rain rate
Pioggia mese:	mm	Month Rain
Pioggia anno:	mm	Year Rain

APIs

Today, there is no APIs activated and web services will be created to connect the iCity Platform, through three different methods:

getWetherStation() :

it will returns the list of stations with their attributes

Station ID	Connection Technology	Municipality Area
GPRS_bavari	Wireless (GPRS)	Bavari
GPRS_begato	Wireless (GPRS)	Begato
GPRS_cesino	Wireless (GPRS)	Cesino
GPRS_crevari	Wireless (GPRS)	Crevari
GPRS_fabbriche	Wireless (GPRS)	Fabbriche
LAN_genovacentro	Cable	Genoa
GPRS_granarolo	Wireless (GPRS)	Granarolo
GPRS_murta	Wireless (GPRS)	Murta
LAN_nervi	Cable	Nervi
LAN_pegli	Cable	Pegli
GPRS_pino	Wireless (GPRS)	Pino Sottano
GPRS_pontedecimo	Wireless (GPRS)	Ponte Decimo
LAN_pra	Cable	Prà (CEP)
GPRS_pra	Wireless (GPRS)	Prà
LAN_prato	Cable	Prato
LAN_quarto	Cable	Quarto
GPRS_quezzi	Wireless (GPRS)	Quezzi
LAN_sanpierdarena	Cable	Sampierdarena
GPRS_cosimo	Wireless (GPRS)	Cosino
GPRS_eusebio	Wireless (GPRS)	Eusebio
GPRS_scarpino	Wireless (GPRS)	Scarpino

LAN_sestri	Cable	Sestri Ponente
LAN_voltri	Cable	Voltri

getDataStation(Station ID):

It will return the data the data relating to the sensor identified by the parameter Station ID as described in the previous data model

GetStatus(Station ID):

The method will return a boolean value (true or false) , depending on the sensor status (active or not) .

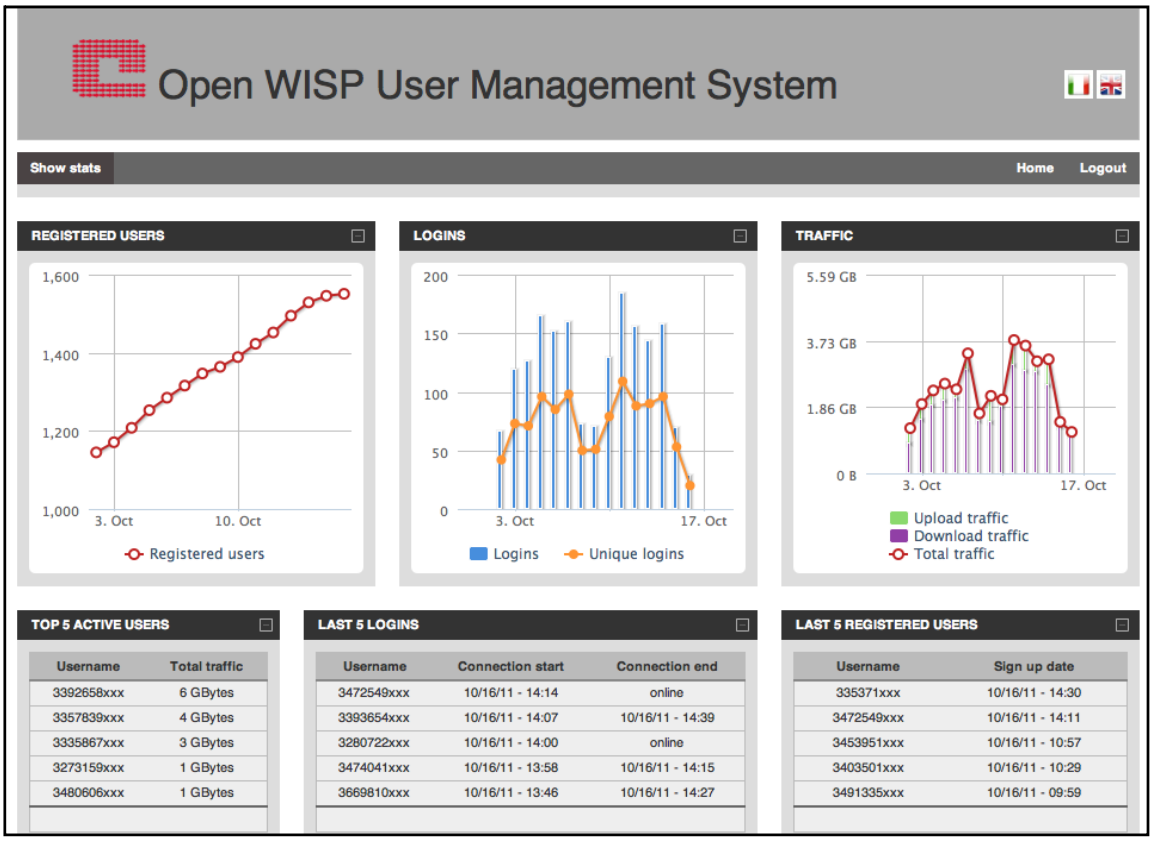
4.4 WIFI

FreeWiFiGenova is based on OpenWISP software suite. The reporting tool is **OpenWUMS** that is a web-application based on the Ruby on Rails framework that allows a WISP to manage its user base. It provides self-provisioning of users credentials and self-management of account data (in compliance with Italian laws regarding users identification).

With OpenWUMS it is possible to create an account (and verify its underlying identity) just through a telephone call or by performing an economic transaction with PayPal or a credit card.

Users can also recover their credentials by making a telephone call or using their e-mail addresses.

Last but not least users can consult their sessions history with both graphs and in a tabular form.



Security

As for internet browsing and more generally the Wifi, the Italian law provides specific rules. In particular it is not allowed public bodies to provide this service except through a private company with the appropriate permissions.

The system is currently managed by a company which provides Authentication via SSL for user groups:

O.W.U.M.S (Open Wisp User Management System) to grant users reporting functionalities on data collected by the system.

O.W.G.M. (OPEN monitoring Wisp Geographic) to give users features related to active Hotspots.

Data model

Time Format

function(value)

```
var h=Math.floor(value/3600); //hour
var m=Math.floor(value/60)-(h*60); // minutes
var s=Math.floor(value-(h*3600)-(m*60)); // seconds
var hours = (h < 10 ? '0' : '') + h;
var minutes = (m < 10 ? '0' : '') + m;
var seconds = (s < 10 ? '0' : '') + s;
```

Bytes formatter

function(bytes, label)

```
bytes = Math.floor(bytes);
if (bytes == 0) return '0 B';
var s = ['B', 'KB', 'MB', 'GB', 'TB', 'PB'];
var e = Math.floor(Math.log(bytes)/Math.log(1024));
var value = ((bytes/Math.pow(1024, Math.floor(e))).toFixed(2));
e = (e<0) ? (-e) : e;
if (label) value += ' ' + s[e];        return value;
```

Data Format

```
dateFormat: 'dd/mm/yy',
firstDay: 1,
closeText: 'Chiudi',
prevText: '&#x3c;Prec',
nextText: 'Succ&#x3e;',
currentText: 'Oggi',
monthsShort:['Gen','Feb','Mar','Apr','Mag','Giu','Lug','Ago','Set','Ott','Nov','Dic'],
weekdaysShort: ['Dom','Lun','Mar','Mer','Gio','Ven','Sab'],        weekdaysMin:
['Do','Lu','Ma','Me','Gi','Ve','Sa']
```

APIs

OpenW.U.M.S. Web services returns data in JSON format.

Parameter	Description	Format
From	Start Date	Date
To	End Date	Date
Utf	Unicode Transformation Format	Char Code

Registered Users Connector

https://selfcare.freewifigenova.it/owums/stats/registered_users.json

Output	Description	Format
name": "Utenti registrati”	Registered Users	String
data":[[milliseconds,Registered Users]”	Registered Users at XXX milliseconds	Int

Example:
https://selfcare.freewifigenova.it/owums/stats/registered_users.json?&from=01%2F01%2F2013&to=02%2F01%2F2013

[{ "name": "Utenti registrati", "data":

[[1356998400000,13366],[1357084800000,13397]] }]

Register Logins

https://selfcare.freewifigenova.it/owums/stats/logins.json

Output	Description	Format
"name": "Accessi",	Daily Total Access	String
data":[[milliseconds, Daily Total Access]"	Daily Total Access per millisecond	Int
"name": "Accessi",	Daily Unique Access	String
data":[[milliseconds, Daily Unique Access]"	Daily Total Unique Access per millisecond	Int

Example:

[{ "name": "Accessi", "data":

[[1357257600000,1388],[1357344000000,776],[1357430400000,145],[1357516800000,1285],[1357603200000,1314],[1357689600000,1298],[1357776000000,1236],[1357862400000,1245],[1357948800000,767],[1358035200000,164],[1358121600000,1267],[1358208000000,1365],[1358294400000,1249],[1358380800000,1164],[1358467200000,1205]] },

{ "type": "line", "name": "Accessi unici", "data":

[[1357257600000,477],[1357344000000,270],[1357430400000,84],[1357516800000,440],[1357603200000,461],[1357689600000,467],[1357776000000,463],[1357862400000,444],[1357948800000,290],[1358035200000,72],[1358121600000,438],[1358208000000,457],[1358294400000,440],[1358380800000,410],[1358467200000,408]] }

Traffic

Output	Description	Format
"name": "Traffico in upload",	Daily Total Uploaded in Bytes	String
data":[[milliseconds, Daily Total Uploaded Byte]"	Daily Total Uploaded in Bytes per millisecond	Int
"name": "Traffico in download",	Daily Total Downloaded in Bytes	String
data":[[milliseconds, Daily Total Downloaded Byte]"	Daily Total Downloaded in Bytes per millisecond	Int
"name": "Traffico totale",	Daily Total Traffic in Bytes	String
data":[[milliseconds, Daily Total	Daily Total Traffic in Bytes	Int

Traffic Byte]”	per millisecond	

https://selfcare.freewifigenova.it/owums/stats/traffic.json

Example:

[{ "name": "Traffico in upload", "data": [[1357257600000,4991279572],[1357344000000,2298266639],[1357430400000,276153851],[1357516800000,3404155073],[1357603200000,3644403259],[1357689600000,3754783082],[1357776000000,2924641945],[1357862400000,4036114973],[1357948800000,2494079349],[1358035200000,381153777],[1358121600000,2649821331],[1358208000000,3846451449],[1358294400000,3083311703],[1358380800000,2980937442],[1358467200000,2810758111]] }, { "name": "Traffico in download", "data": [[1357257600000,23994816056],[1357344000000,12565794422],[1357430400000,3170011917],[1357516800000,19641371689],[1357603200000,19953711426],[1357689600000,22592698606],[1357776000000,20044834854],[1357862400000,20917799213],[1357948800000,12189717534],[1358035200000,4162365844],[1358121600000,19773975736],[1358208000000,21651709979],[1358294400000,20825800688],[1358380800000,19243558473],[1358467200000,19151738003]] }, { "type": "line", "name": "Traffico totale", "data": [[1357257600000,28986095628],[1357344000000,14864061061],[1357430400000,3446165768],[1357516800000,23045526762],[1357603200000,23598114685],[1357689600000,26347481688],[1357776000000,22969476799],[1357862400000,24953914186],[1357948800000,14683796883],[1358035200000,4543519621],[1358121600000,22423797067],[1358208000000,25498161428],[1358294400000,23909112391],[1358380800000,22224495915],[1358467200000,21962496114]] }]

4.5 Citizens Desk

This type of infrastructure is mainly based on the information stored on a Microsoft SQL database and managed through web and mobile applications. Through this system citizens request information about department or work processes, receive documentation or forms by mail or fax, check the opening hours of the offices. There is also information about tourist and cultural points of interest, or security and public health structures (police stations, hospitals, embassies, etc.).

The system is managed and used by a municipal department but may be open to other agencies on the municipal territory to expand the supply of information and manage them in an integrated way.

Opening this infrastructure means to implement a new security model based on SAML, already used by the municipality.

Data model

A data model of the database citizens desk is presented in Annex II chapter 9.1.

5. iCity pilot scenarios and use cases for Bologna

This section presents the iCity Platform use cases to identify specific characteristics and requirements for the iCity Platform in Bologna.

5.1 Overview of services and data to be accessed through the iCity Platform

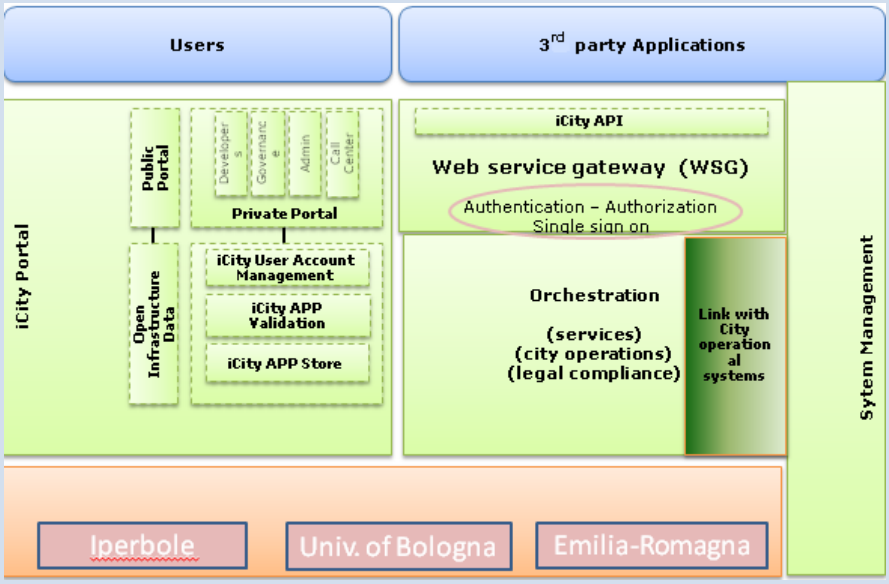
Wide spreading innovation in urban environments requires the possibility for citizens to benefit from ubiquitous connectivity in the areas where they live and group together. Despite the large market penetration of 3G wireless solutions, such as, UMTS, and the potential impact of innovative technologies, such as 4G LTE, it seems still difficult for a large fraction of the population to actually take advantage of existing networking solutions. In fact, accessing available wireless technologies requires citizens to subscribe to contracts with network operators that increase the (already) non-negligible expenses families devote to networking services, such as the residential ADSL, etc.

Since wireless-enabled terminals, such as mobile phones, tablets, and netbooks, are extremely popular among citizens, the municipality of Bologna invested in the design, development and deployment of a metropolitan wireless area network, dubbed Iperbole Wireless. Iperbole Wireless provides free network access to citizens, commuters, tourists and students who are located in the city, thus encouraging the design and implementation of innovative services and applications of local interest, tailored to the needs of different domains, ranging from traffic management [10], to tourism [11], to event promotion [12], pizza delivery [13], etc. To further amplify the impact of the availability of the municipal wireless infrastructure, the municipality of Bologna has also promoted the federation of locally available wireless networks and the integration of technologies deployed in the Free Wi-Fi Italia initiative, the distribution of the wireless technologies through a “Wireless Kit”, as well as, the diffusion within the society of the skills needed to let citizens take full advantage of the wireless-enabled services and applications.

5.2 The wireless municipal infrastructure «Iperbole Wireless»

BOL-US1	**Wireless Networking**
Description	Since wireless-enabled terminals, such as mobile phones, tablets, and netbooks, are extremely popular among citizens, the municipality of Bologna invested in the design, development and deployment of a metropolitan wireless area . Iperbole Wireless provides free network access to citizens, commuters, tourists and students who are located in the city, thus encouraging the design, and implementation of innovative services and applications of local interest tailored to the needs of different domains, ranging from traffic management [10], to tourism [11], to event promotion [12], pizza delivery [13], etc. In addition to the development of the Iperbole Wireless

	infrastructure, the Municipality of Bologna worked to further extend the coverage of the available network and to simplify the access for a large proportion of its citizens. For example, the municipality promoted the federation of identity management among different locally available wireless infrastructures, including, the University of Bologna Wireless Infrastructure, and Wisper, the Emilia-Romagna Region Wireless network. In addition, the Municipality of Bologna decided to join the Free Italia Wi-Fi initiative that makes it possible for the citizens of Bologna to use Iperbole Wireless credentials in different cities [14] such as Turin, Venice, etc. For the sake of maximizing the benefits deriving from the adoption of Wi-Fi technology in urban settings, the municipality of Bologna distributed Wi-Fi routers, called “Wireless Kits”, to local partners, such as, bars and restaurants, thus increasing the overall available network coverage [15]. In order to guarantee the economic sustainability of the initiative, Wireless Kits are distributed at a very low price and their management is delegated to the initiative partners. Finally, because the lack of basic technical skills could complicate the access to innovative services and applications, the Municipality of Bologna also provided training to its citizens. Younger adults, and especially those belonging to minority groups, were encouraged to volunteer to assist fellow citizens in configuring and using their portable devices. This not only helped to diffuse knowledge of the technology among the society, but also promoted social empowerment and cohesion, as well as, intergenerational interaction between individuals.
Category	Technical, organization
Domain	Public Infrastructure services
Goals and purpose	To implement a unified technology infrastructure to enable the widespread adoption of innovative services and applications devoted to serve anywhere and anytime the needs of citizens, commuters, students, and tourists.
Actors and Roles	The actors participating in the scenario (and their roles) are described using the table below: Actor — Roles Iperbole Wireless Credential Management Service — User network access credential management service of the Iperbole Wireless infrastructure, which is in charge of enabling the authentication of users and of granting network access. Credential — User credential management support of

	Management Services of Federated Wireless Networks	federated networks
	City users	Citizens of Bologna, students, commuters, tourists
Components and services required for execution, and proposed architecture	As depicted in the figure below the iCity Platform is central to the implementation of the presented use case, and various services are involved in the service provisioning.  iCity architecture has to include the following components: • iCity Portal for the management of Iperbole Wireless user credential and for the implementation of the “walled garden” support needed to enable user authentication. • iCity Management Support to guarantee the continuity of service provisioning and to detect possibly occurring failures in the deployed infrastructure. • iCity Data Management Support to allow seamless integration between different authentication solutions • iCity Governance Components to simplify the management tasks needed for operating the iCity infrastructure integration: support for enabling the integration of innovative services and applications of local interest tailored to the needs of different domains	

New specifications required between the actors	iCity API Specifications
Related use cases	List of use cases related to this scenario: • BOL-US1-UC-Org-1 - Access to the Wireless infrastructure

Organizational use case	
BOL-US1-UC-Org-1	**Access to the wireless infrastructure**
Description	Enable access to the metropolitan Wireless Area Network to various city users including citizens, students, commuters and tourists. Users can use the credentials previously obtained in a federated wireless networking environment or they can request credential to the Iperbole Wireless infrastructure. In the latter case, user access credential will be obtained by filling a form with identity information and the user mobile phone number. Credential will be forwarded to the user via a SMS.
Actors and roles	Actors and their roles participating in the use case, described using a table as follows:

Actor	Roles
City Users	Citizens of Bologna, students, commuters, tourists
Iperbole Wireless Credential Management Service	User credential management support.
Federa, the Emilia-Romagna Region wireless infrastructure credential management service	User credential management support
University of Bologna wireless network credential management service	User credential management support
Free Wi-Fi Italia Credential management service	User credential management support
iCity Platform	

Primary Actor	City Users
Goals and	The main goal is to specify the main technical process of the iCity

aspirations for the UC	Platform - obtaining, processing and forwarding data on request of the registered user.
Platform, tools and the environment needed for execution of the UC	to be clarified
Description of file formats, wire protocols, in-memory objects, and other artifacts needed for execution	Network access is subject to user authentication. In particular, in full conformance with national regulations, the Iperbole Wireless infrastructure implements a SAML-based authentication management support, which is compliant with the results of the inter-regional project ICAR
Components and services required for execution	• iCity Portal for the management of Iperbole Wireless user credential and for the implementation of the “walled garden” support needed to enable user authentication. • iCity Management Support to guarantee the continuity of service provisioning and to detect possibly occurring failures in the deployed infrastructure. • iCity Data Management Support to allow seamless integration between different authentication solutions • iCity Governance Components to simplify the management tasks needed for operating the infrastructure
Available components	• iCity Portal for the management of Iperbole Wireless user credential • iCity Management Support to guarantee the continuity of service provisioning • ICity integration support for enabling the integration of innovative services and applications of local interest tailored to the needs of different domains
Input parameters needed for initialization / use case preconditions	N/A
Criteria for success	Significant improvement of the networking opportunities for city users, with potential impact in term of the development of 3rd party application development.
Failure conditions	Failure of devices and/or integration components
Failure handling	Continuous monitoring to reduce the risk of failure and implementation of failure management procedures that based on a

	priory defined SLA enable continuous operability to the infrastructure.
Related use cases and those that are pre-requisite	N/A
Existing specifications to rely on	• Federa specifications • Radius protocol specifications • LDAP Protocol Specifications • Free Wi-Fi Italia Specifications
New specifications required between the actors	iCity API specification

5.3 MAN – Optical fiber broadband network

The Municipality of Bologna will provide the local community with the possibility to access to the broad-band FTTH MAN.

The network currently connects the main public buildings, including municipal buildings, schools, and libraries, and provides suitable networking support for citizens and associations willing to benefit from network-intensive services, such as video-conferences, streaming and so forth.

The iCity Platform user will be the ICT Department.

The End users are Public bodies staff, citizens and students.

5.4 Municipal Cloud - data center for cloud computing, data processing, storage and network security

According with the spirit of its civic network, the Bologna Municipality will make it possible for citizens and non-profit associations to run web sites, blogs, Internet-based services by relying on the Municipal Infrastructure.

The service is organized according to an Infrastructure as a Service (IaaS) model and the access to computational resources will be ruled according to a governance approach to guarantee the no-profit nature of initiatives, as well as, their conformance to local and national regulations.

5.5 TappER Platform

By the end of 2013 the Municipality of Bologna will release TappER, a middleware-level solution that will promote and simplify the implementation of mobile-government applications. Tapper will be integrated with the main services of the municipal information system, and will provide a rich set of APIs with the main goal of enabling the development of advanced applications that benefit from identity management, micro-payment support, etc.

6. Digital Footprint - Assessment per city

The chapter presents the assessment findings per city for each of the areas:

- Governance model
- Infrastructure assessment
- Operational model
- Definition of the Services using public infrastructures to be implemented in the pilots

What needs to happen in all cities is that the iCity Platform needs to bring application intelligence into the network and enable efficient deployment of secure, reliable, and accelerated Web service environments based on XML (Extensible Markup Language) or JSON (Javascript Object Notation) and SOAP (Simple Object Access Protocol) or REST (Representational State Transfer) using a shared, network infrastructure.

This is what we call the web services gateway (WSG) function of the platform.

It is clear that we need to implement a clear policy and API governance around managing those APIs in the iCity Platform; what is the availability, the use, the performance of the whole system etc.

The iCity Platform also need to make sure that none of the applications that expose the APIs can be impacted by attacks or other abuse.

A very important aspect is the enabling of the 3rd party ecosystem developers community.

The creation of an iCity developer portal will empower the developer to register for an account, request access to the APIs, and find examples.

6.1 Assessment in Barcelona

The City of Barcelona presents three scenarios with its own use cases. In Barcelona, the city **owns** most of the infrastructure. In the first one, related to the Barcelona WIFI Mesh, Cisco has provided hardware to enable the location based services testing for the iCity project. This means that Barcelona's council has to approve the installation of all devices and systems.

In the other scenarios, Barcelona owns the infrastructure and they open them to the iCity Platform through APIs. The iCity Platform has to integrate both systems, including them into the other functions of the iCity Platform like management system and the Portal.

6.2 Assessment in London

As the city in London **does not own** the infrastructure, we need to get the approval from TfL to get access to the Wi-Fi network in the tube stations. The transport for London works with partners that maintain the Wi-Fi network and they have SLAs to meet. So an additional challenge is to work with the partners without causing an impact on their current SLAs agreed with TfL. We have had already initial meetings with Fujitsu as one of the partners involved.

So a formal approval to use the TfL Wi-Fi network for enabling 3rd party developers is still pending while writing this final report.

We will replicate the London setup in the lab to facilitate the iCity Platform testing but also to convince all involved parties to provide us access. The iCity Platform web services gateway functionality need to make sure that we manage the API securely.

London has also provided us access to the air quality data via a REST API, but requested to host part of their services on the iCity Platform as they don't have enough processing power.

6.3 Assessment in Genoa

Genoa has provided information about following infrastructures:

- Mobility
- Environment
- Wifi
- Citizen desk

It is clear that also in Genoa, the iCity Platform will interface also via an API.

Most of the APIs will need to be developed.

6.4 Assessment in Bologna

In Bologna it is important that the iCity Platform supports the need to integrate with existing identity systems.

The iCity Platform need to integrate with the Bologna identity/access management, SSO (single-sign-on) and federation systems, as well as the Bolgona (including the Iperbole community) authentication and authorization standards.

We have not received technical details from Bologna.

7. Main Conclusions and Findings

Not only in social web and enterprise environments is the use of APIs increasingly popular, now the cities are opening up their infrastructure mostly by providing an API. The cities are providing APIs to enable their partner ecosystem to create innovative applications. Although it will offer new streams of revenues for the cities and new services for their citizens, the implementation introduces new challenges and risks and need to happen with care.

That cities are aware about the risks is very clear. In none of the cities, we will get direct access to the infrastructure; only through an API access controlled by the City, access will be provided.

8. Annex I: References

[1] http://www.dis.uniroma1.it/~midlab/articoli/EG6642.pdf

[2] OAC : http://www.bcn.es/sac/

[3] Barcelona Web Site:

[4] http://www.bcn.cat/publicacions/b_barris/arxiu/07_gener/Sarria_SantGervasi.pdf

[5] Bologna Traffico Web Site: http://www.bolognatraffico.it/

[6] Bologna Welcome Web Site: http://www.bolognawelcome.com

[7] Future Film Festival Web Site: www.futurefilmfestival.org

[8] PizzaBo Web Site: http://www.pizzabo.it/

[9] Free Wi-Fi Italia Web Site: http://fiwen.provincia.roma.it/administrations-line

[10] Wi-Fi Kit Web Site: http://www.comune.bologna.it/wireless/en/open-a-Wi-Fi-area-

[11] Bologna Traffico Web Site: http://www.bolognatraffico.it/

[12] Bologna Welcome Web Site: http://www.bolognawelcome.com

[13] Future Film Festival Web Site: www.futurefilmfestival.org

[14] PizzaBo Web Site: http://www.pizzabo.it/

[15] Free Wi-Fi Italia Web Site: http://fiwen.provincia.roma.it/administrations-line

[16] Wi-Fi Kit Web Site: http://www.comune.bologna.it/wireless/en/open-a-Wi-Fi-area-

9. Annex II

9.1 Datamodel for Citizen Desk in Genoa.

The following is the xml schema that covers the main data in the database Citizen's Desk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<COLUMN SOURCE="80" NAME="Chi_Codice_direzione_SIB" xsi:type="SQLINT" />
<COLUMN SOURCE="81" NAME="Chi_Codice_settore_SIB" xsi:type="SQLINT" />
<COLUMN SOURCE="82" NAME="Chi_Descrizione_direzione_SIB" xsi:type="SQLNVARCHAR" />
<COLUMN SOURCE="83" NAME="Chi_Descrizione_settore_SIB" xsi:type="SQLNVARCHAR" />
<COLUMN SOURCE="84" NAME="Dove_Indirizzo" xsi:type="SQLNVARCHAR" />
<COLUMN SOURCE="85" NAME="Dove_CAP" xsi:type="SQLINT" />
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<COLUMN SOURCE="86" NAME="Dove_Citta" xsi:type="SQLNVARCHAR" />
<COLUMN SOURCE="87" NAME="Dove_Telefono" xsi:type="SQLNVARCHAR" />
<COLUMN SOURCE="88" NAME="Dove_Fax" xsi:type="SQLNVARCHAR" />
<COLUMN SOURCE="89" NAME="Dove_Email" xsi:type="SQLNVARCHAR" />
<COLUMN SOURCE="90" NAME="Dove_Cellulare" xsi:type="SQLNVARCHAR" />
<COLUMN SOURCE="91" NAME="Dove_Numero_verde" xsi:type="SQLNVARCHAR" />
<COLUMN SOURCE="92" NAME="Dove_Informazioni_presso" xsi:type="SQLCHAR" />
<COLUMN SOURCE="93" NAME="Altro_Note" xsi:type="SQLCHAR" />
<COLUMN SOURCE="94" NAME="Altro_Link" xsi:type="SQLNVARCHAR" />
<COLUMN SOURCE="95" NAME="rec_id_row" xsi:type="SQLINT" />
<COLUMN SOURCE="96" NAME="rec_id" xsi:type="SQLINT" />
<COLUMN SOURCE="97" NAME="Redazione_Note2" xsi:type="SQLCHAR" />
<COLUMN SOURCE="98" NAME="Accessibile" xsi:type="SQLBIT" />
<COLUMN SOURCE="99" NAME="Criticita" xsi:type="SQLNVARCHAR" />
<COLUMN SOURCE="100" NAME="Dove_Circoscrizione" xsi:type="SQLINT" />
<COLUMN SOURCE="101" NAME="Dove_Unita_Urbanistica" xsi:type="SQLINT" />
<COLUMN SOURCE="102" NAME="Dove_Topo_Codice_strada" xsi:type="SQLCHAR" />
<COLUMN SOURCE="103" NAME="Dove_Topo_Civico" xsi:type="SQLCHAR" />
<COLUMN SOURCE="104" NAME="Dove_Topo_Lettera" xsi:type="SQLCHAR" />
<COLUMN SOURCE="105" NAME="Dove_Topo_Colore" xsi:type="SQLCHAR" />
<COLUMN SOURCE="106" NAME="Dove_Topo_flag_ok" xsi:type="SQLBIT" />
<COLUMN SOURCE="107" NAME="Codice" xsi:type="SQLINT" />
<COLUMN SOURCE="108" NAME="Descrizione" xsi:type="SQLNVARCHAR" />
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  </BCPFORMAT>
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