BIG IoT

Bridging the Interoperability Gap of the Internet of Things

BIG IoT Project

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JORNADAS TÉCNICAS RedIRIS 2017

IoT European Platforms Initiative

European Commission

Horizon 2020
European Union funding
for Research & Innovation

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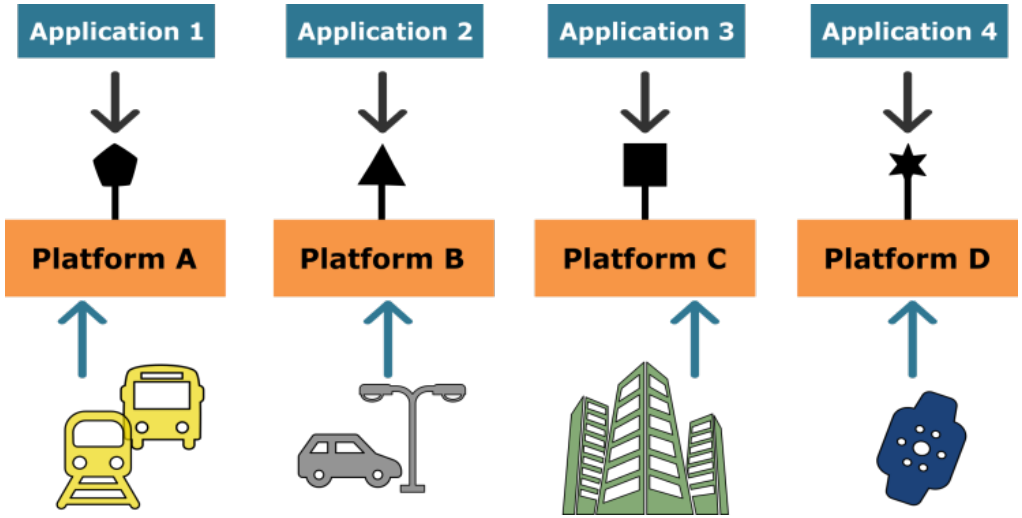
Project Overview

Video

https://youtu.be/H4Vjjvva4X8

Challenge – missing interoperability

- Today, we are dealing with many **heterogeneous**, **vertically oriented** IoT platforms.
- Thus, the development of **cross-platform** and **cross-domain applications** is tedious and expensive.
- Additionally, it leads to **high market entry barriers** for small innovative business.
- As a result of this, **no vibrant IoT ecosystem** exists.



Project‘s Goals

Don’t:

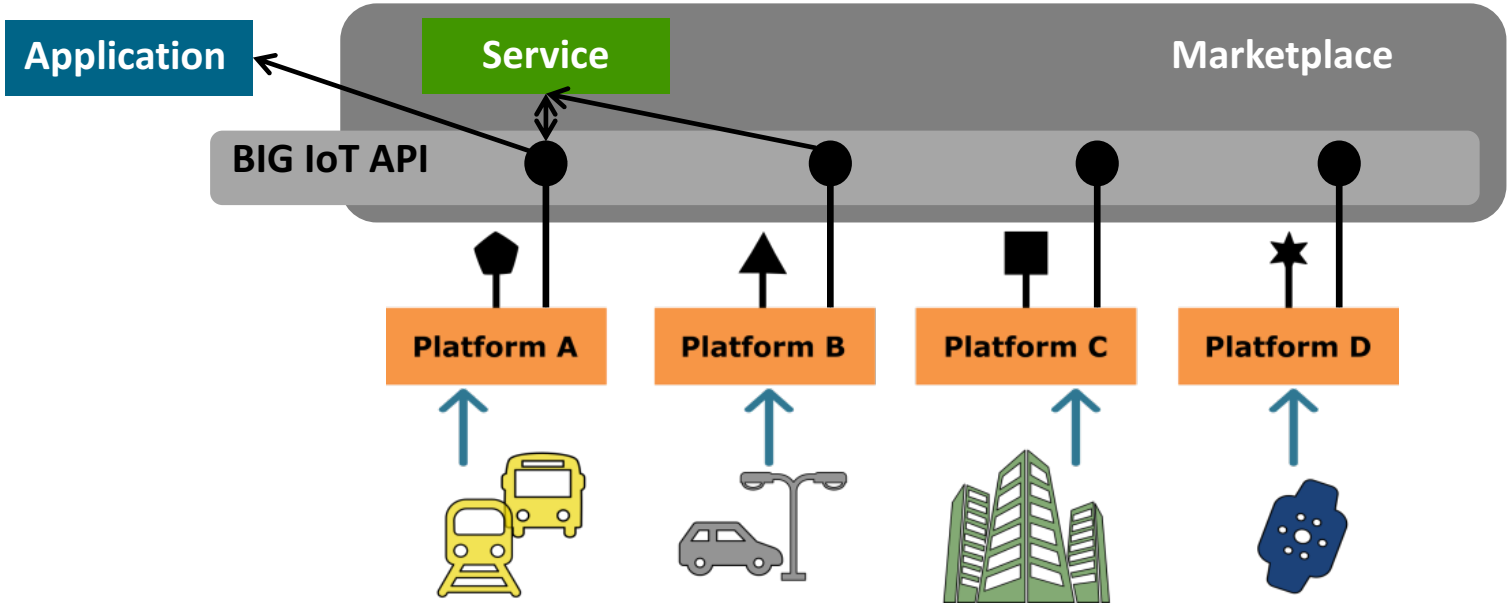
- Develop **yet another platform**

Do:

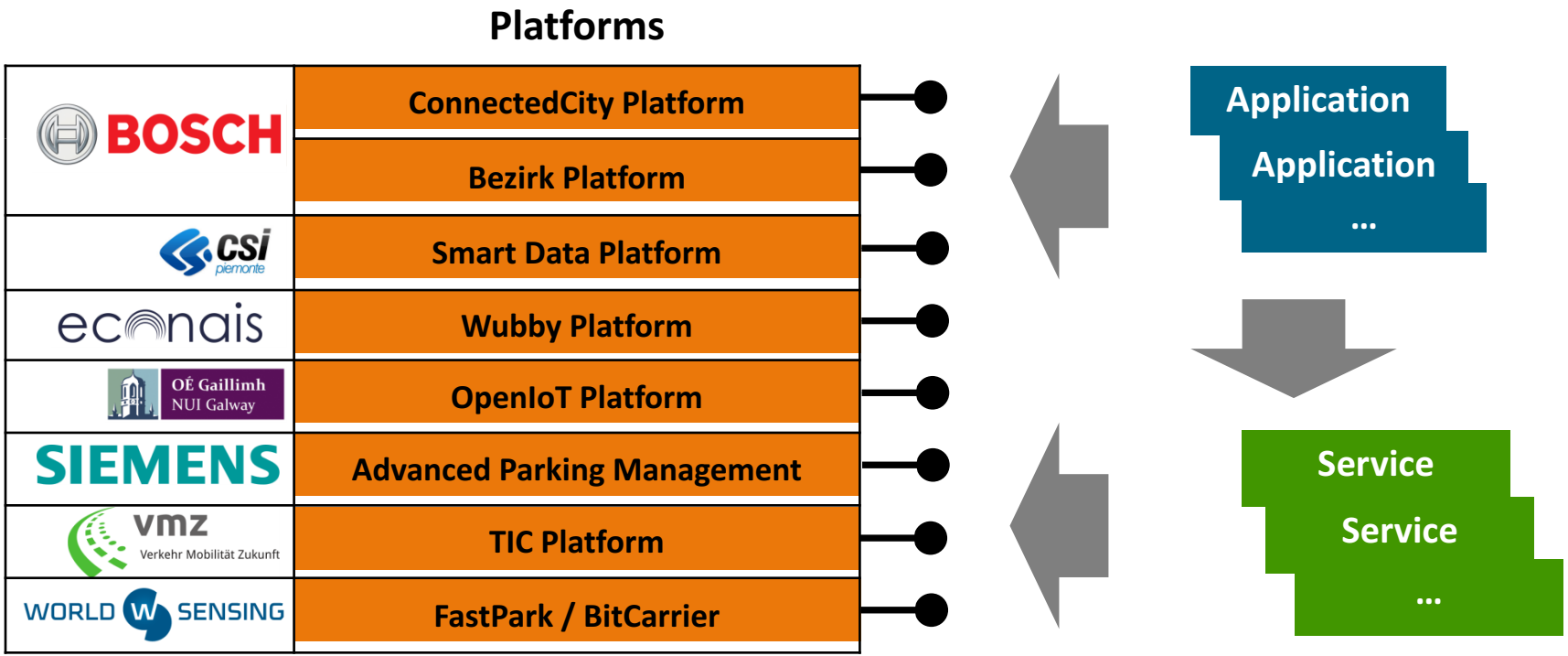
- Enable syntactic & semantic **interoperability** of IoT platforms
- Reuse & build upon existing methods and **standards** to allow interweaving of platforms, things, and users
- Lower market entry barriers
- Foster an open **IoT ecosystems**

Our approach

- **BIG IoT API** to provide and consume IoT resources from different platforms in an unify way
- **Marketplace** to share, discover and monetize IoT resources (data and services)
- Tool for easy development of new, cross- platform services and applications



8 IoT platforms already speak BIG IoT



Pilots & Use Cases

Use Cases in the domain of **Smart Mobility** and **Environmental Monitoring:**

- Smart Parking
- Smart Traffic Management
- Public Transport Optimization
- Healthy Bike Navigation
- Smart Bike Sharing
- Incentive-based Green Route Planning
- Multimodal Route Optimization
- Smart Charging

Project in a nutshell

Project Duration	01.01.2016 - 31.12.2018
Consortium	12 partners + 2 linked 3rd parties

BIG IoT Open Calls

- **€750k** for 3rd parties to implement new IoT solutions or integrate the existing ones into the BIG IoT ecosystem by making use of the BIG IoT enablers
- **2 Open Calls**:
  - first
    - Date: **26th Apr – 16th Jun 2017** – **ONGOING**
    - Budget: €300k (up to €60k per project)
  - second
    - Date: **Jan – Feb 2018**
    - Budget: €450k

1st Open Call Summary

What?

Integrate existing IoT data sources/platforms by using BIG IoT API and **offer** them on the BIG IoT Marketplace. The data sources should be related to **Smart Mobility** and **Environmental Monitoring**.

Why?

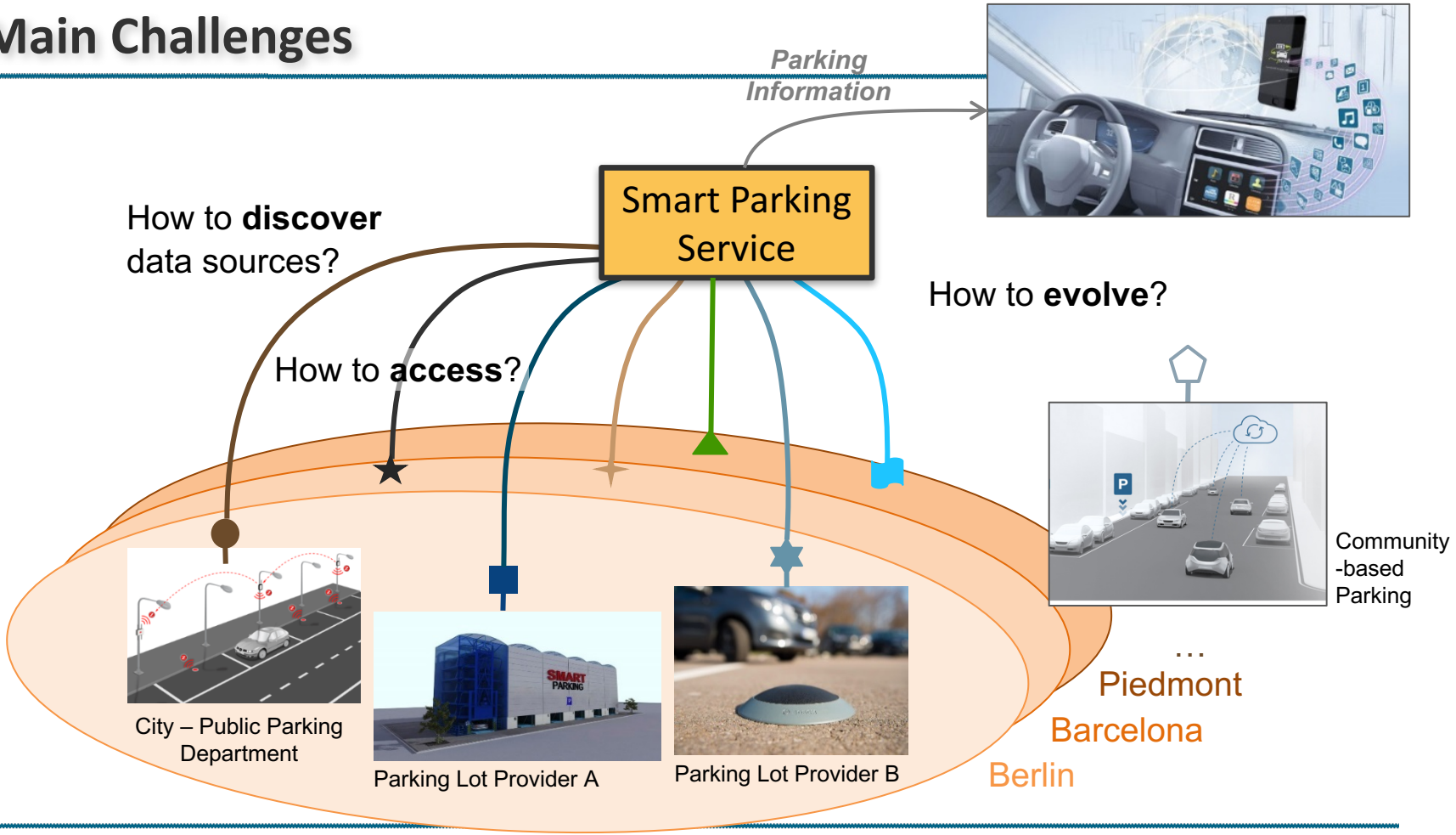
- Join **strong ecosystem** , promote **your solution, increase usage** of your data for **new services and applications** of the second Open Call, get visibility in the European IoT community

When?

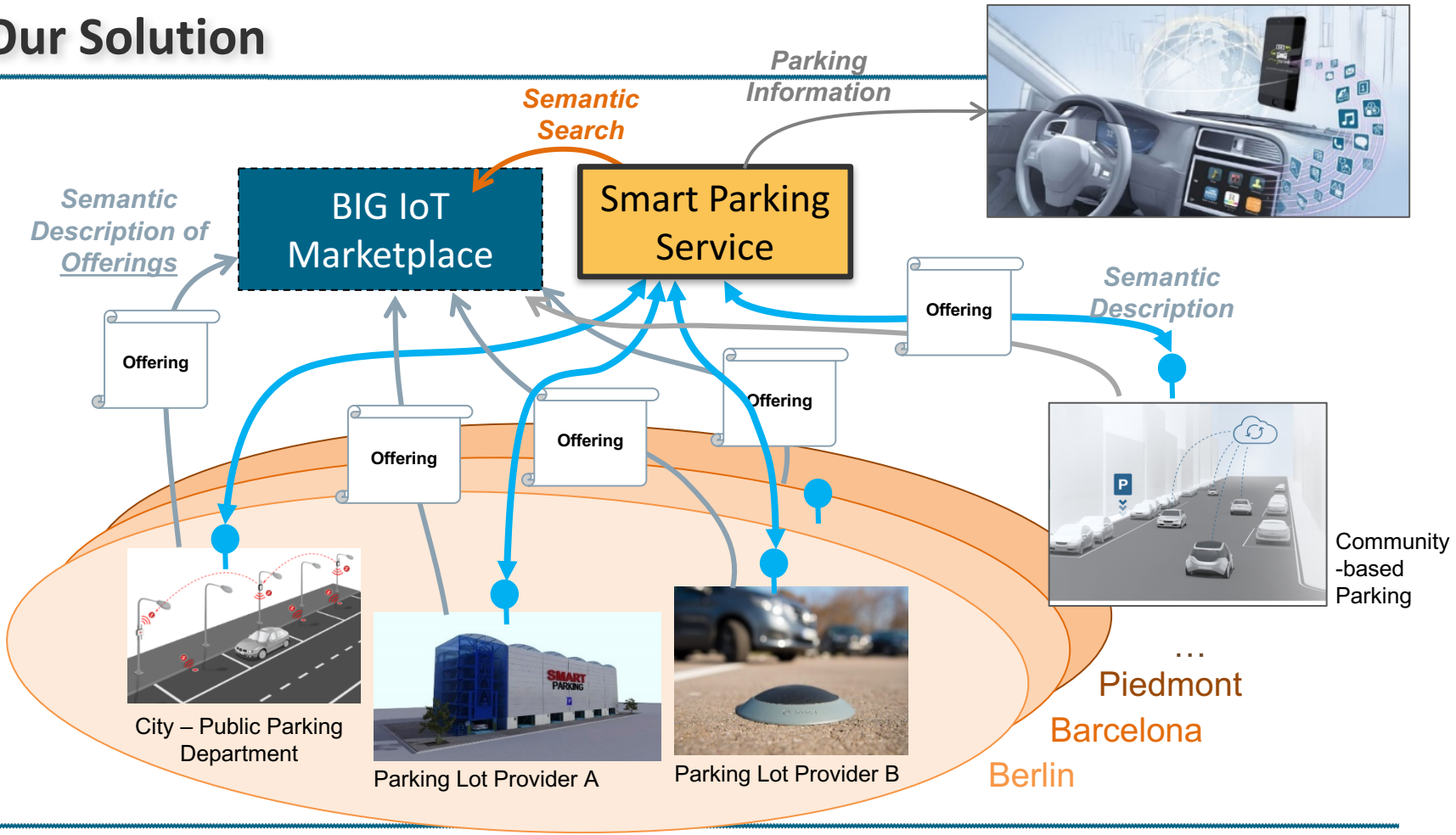
Call Open:	**26th Apr – 16th Jun 2017**
Project Implementation:	**Sep 2017- Jan 2018 (5 months)**

BIG IoT Architecture

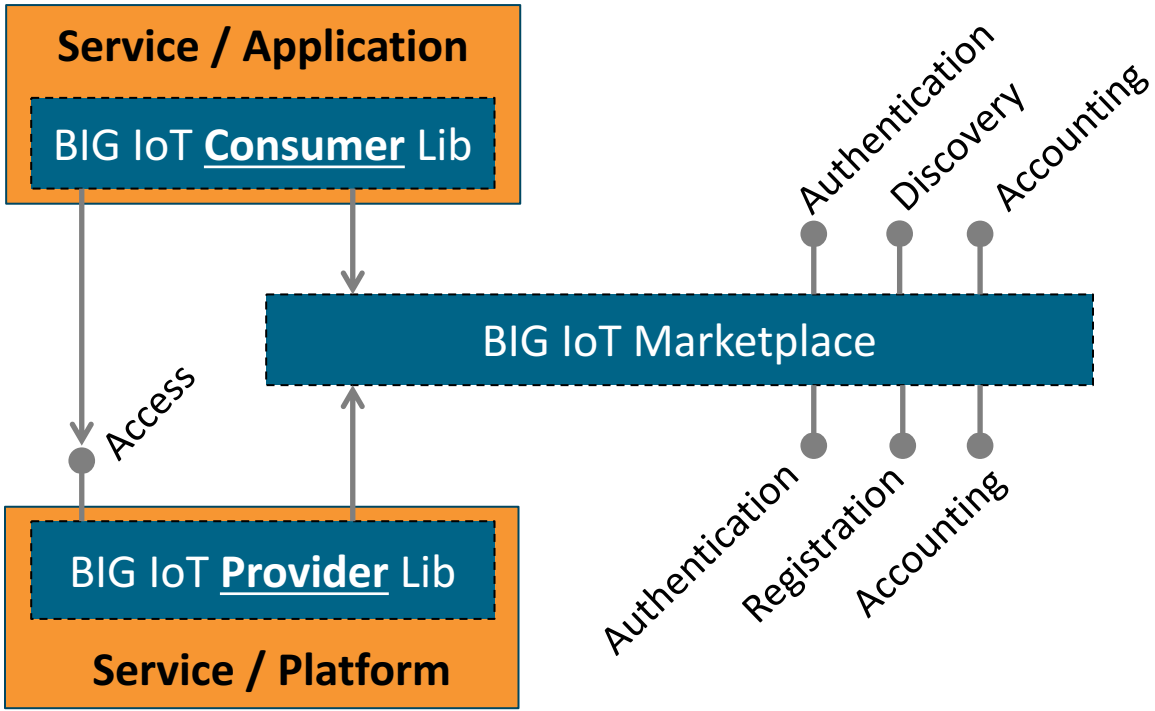
Main Challenges



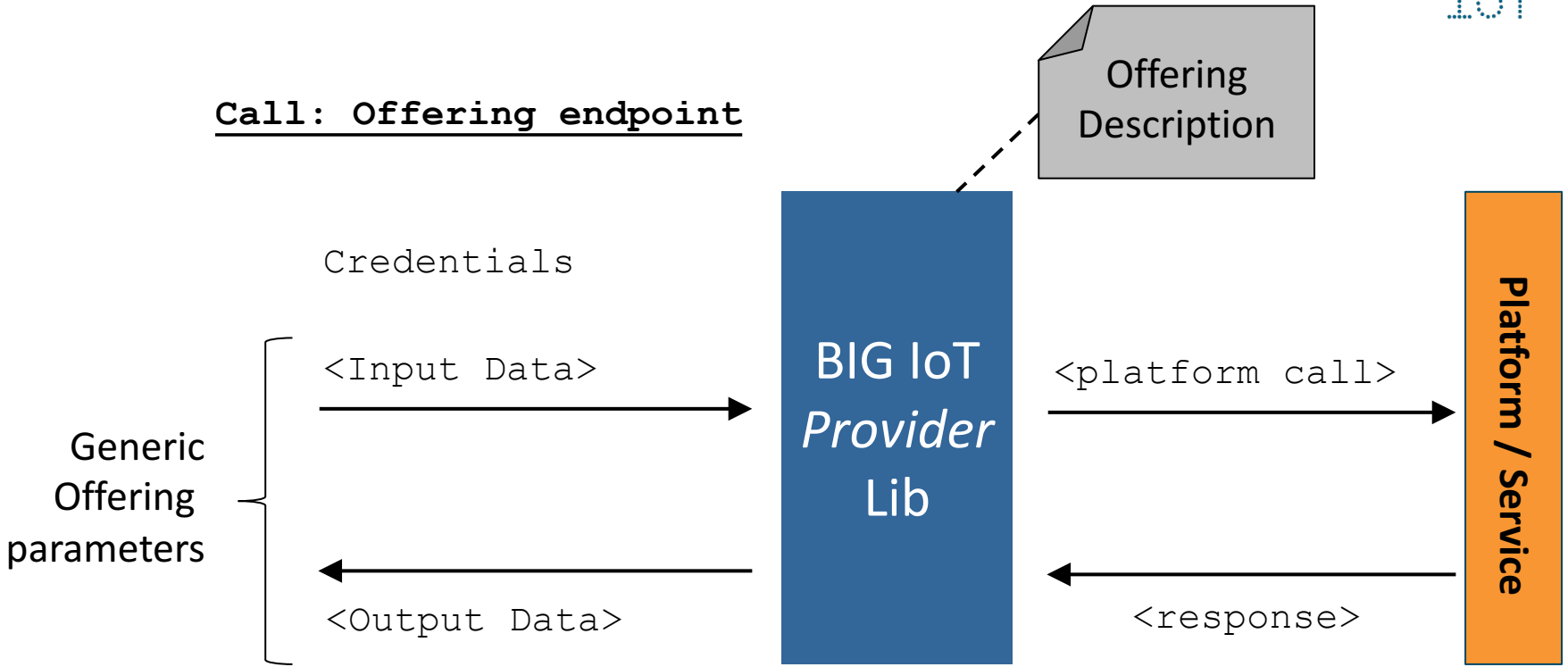
Our Solution



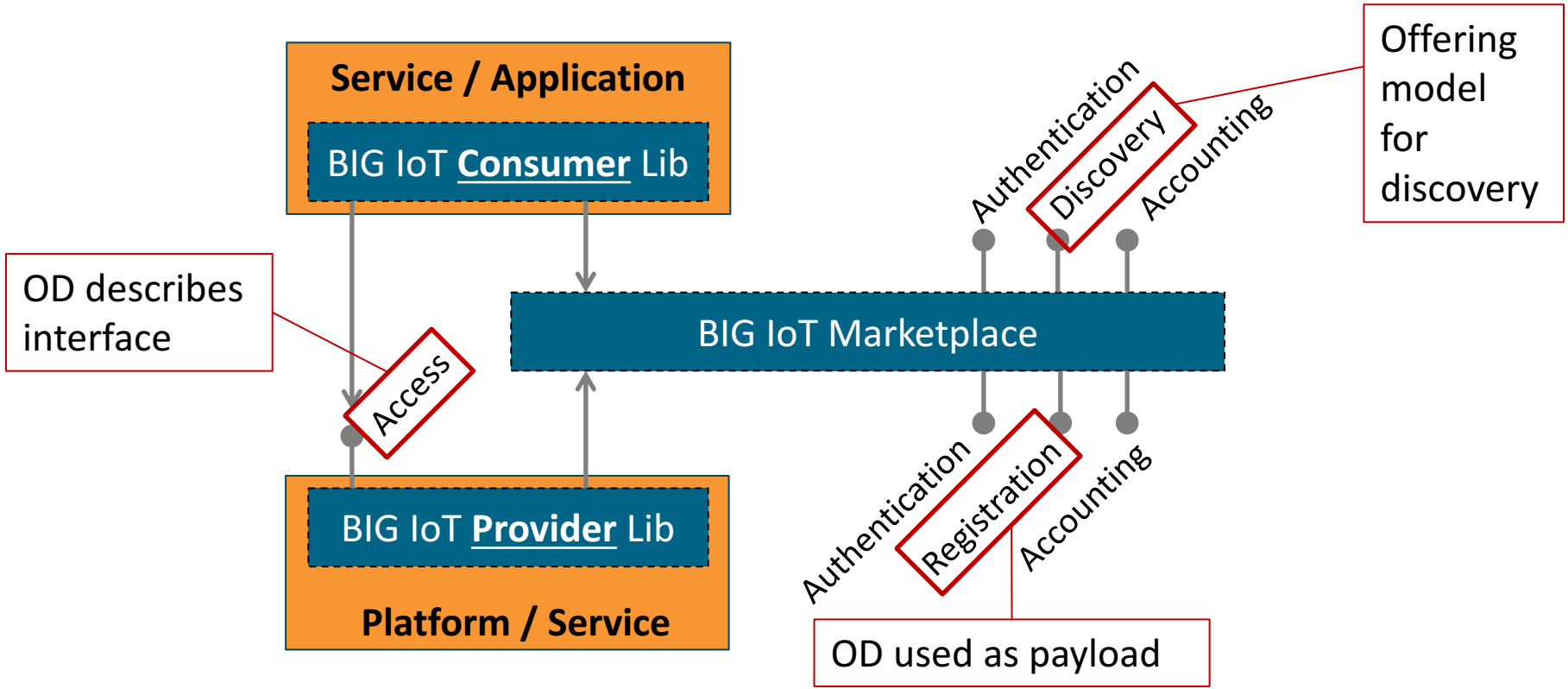
High-level Architecture



BIG IoT API – Access



Offering Description (OD)



Offering Description – Example

```
{ context:     ["http://big-iot.eu/ctx" ,
                {"schema" : "http://schema.org"}],
  providerId: "Barcelona_City-provider"
  name:        "Sensor-level ParkingSpace Information"
  category:    "schema:parkingSiteManagement"

  inputData: [
                {name: "longitude",  rdfType: "schema:longitude"}
                {name: "latitude",   rdfType: "schema:latitude"}
                {name: "radius",     rdfType: "schema:geoRadius"}
  ]
  outputData: [
                {name: "longitude",  rdfType: "schema:longitude"}
                {name: "latitude",   rdfType: "schema:latitude"}
                {name: "status",     rdfType: "schema:parkingSpaceStatus"}
  ]
  endpoints: { uri: "http://bigiot/access/parkinginfo", type: "HTTP_GET"}

  licenseType: "OPEN_DATA_LICENSE", region: "Barcelona"...

  price:  { money: {amount: 0.002000, currency: "EUR"}, accountingModel: "PER_ACCESS"} }
```

Based on W3C® **Web of Things' Thing Description**

Semantic annotations

URI of the Offering

BIG IoT Marketplace ... for whom?

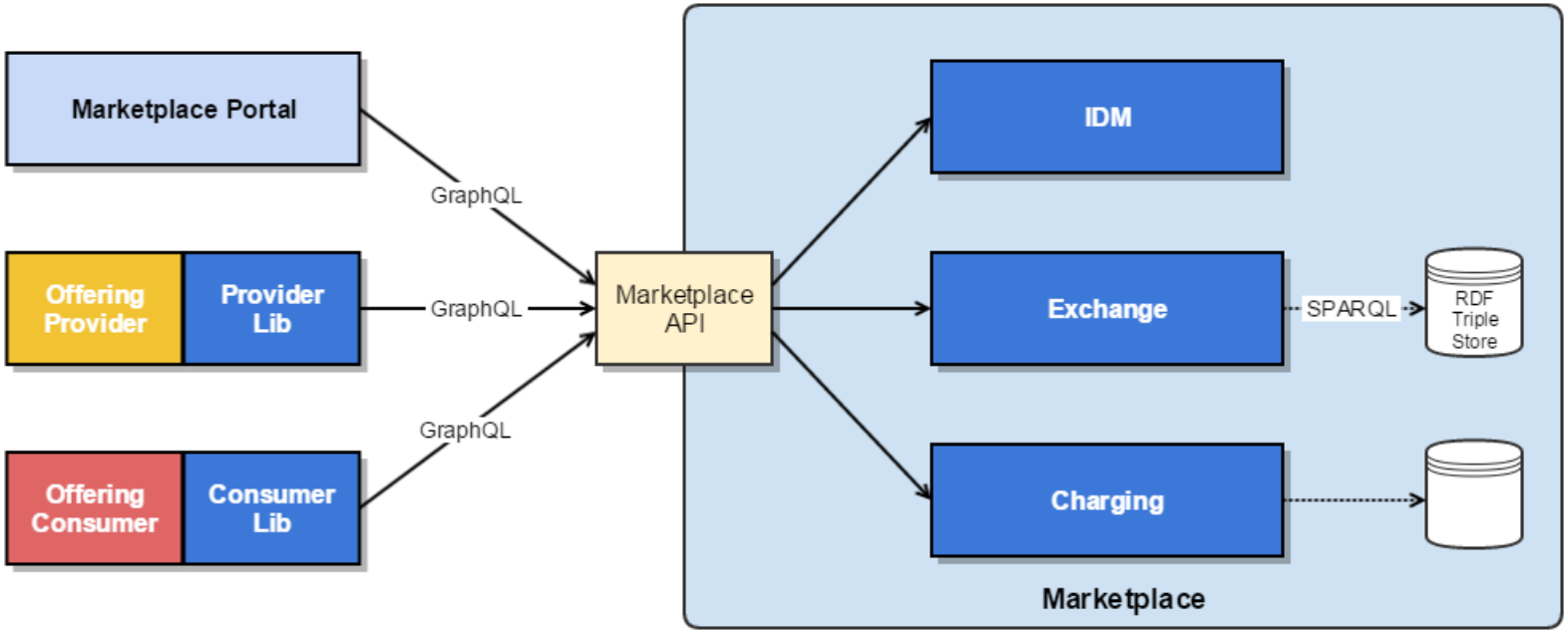
End User ... who are looking for apps

Developers, IT guys, Creatives…

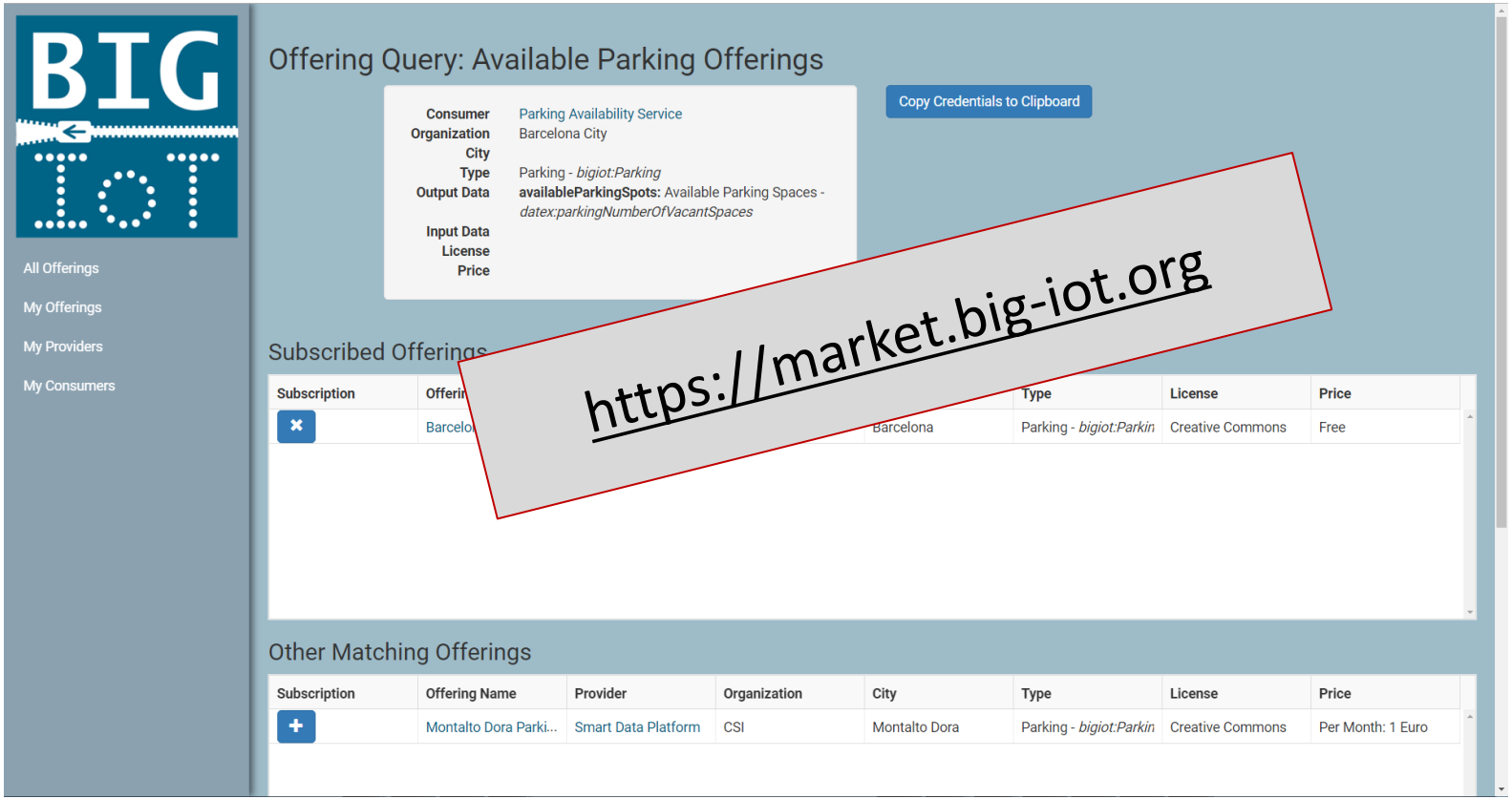
- @ Smart City
- @ Mobility Company

… who need IoT *offerings* for their applications

BIG IoT Marketplace

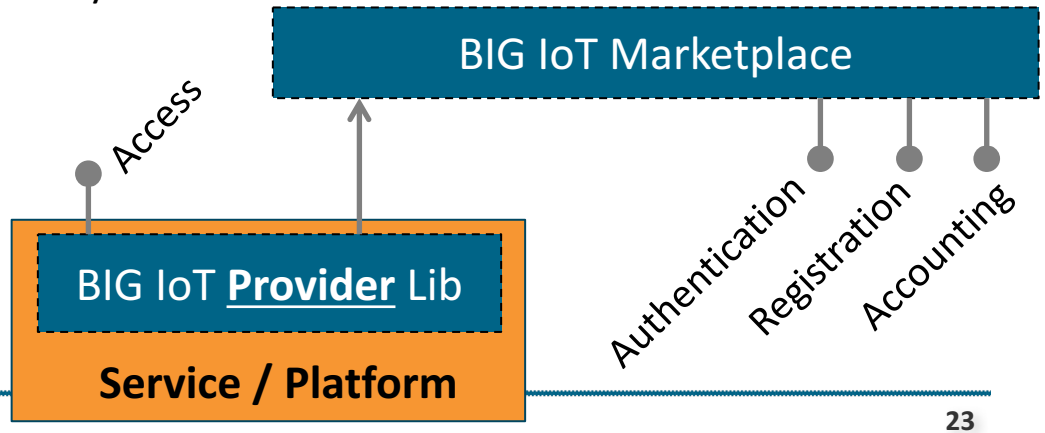


BIG IoT Marketplace Portal

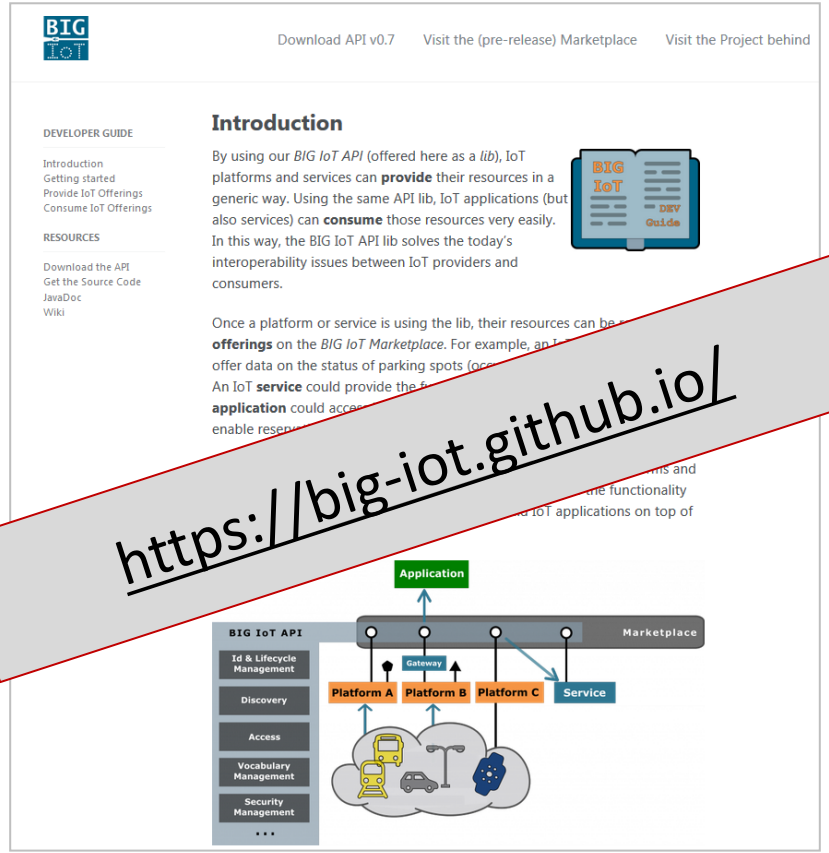


Your tasks to integrate with BIG IoT

1. Utilize **Provider Lib** (currently in Java) to implement access to your *Offerings*
2. Utilize **Provider Lib** to implement interactions with *Marketplace*
3. Create **Offering Description** for each of your offerings to register them
   a. Collaborate to extend the **domain model** to accomodate your offerings
4. Provide offerings at BIG IoT marketplace **until end of BIG IoT project** for all partners
5. Provide **feedback** and shape an IoT Ecosystem

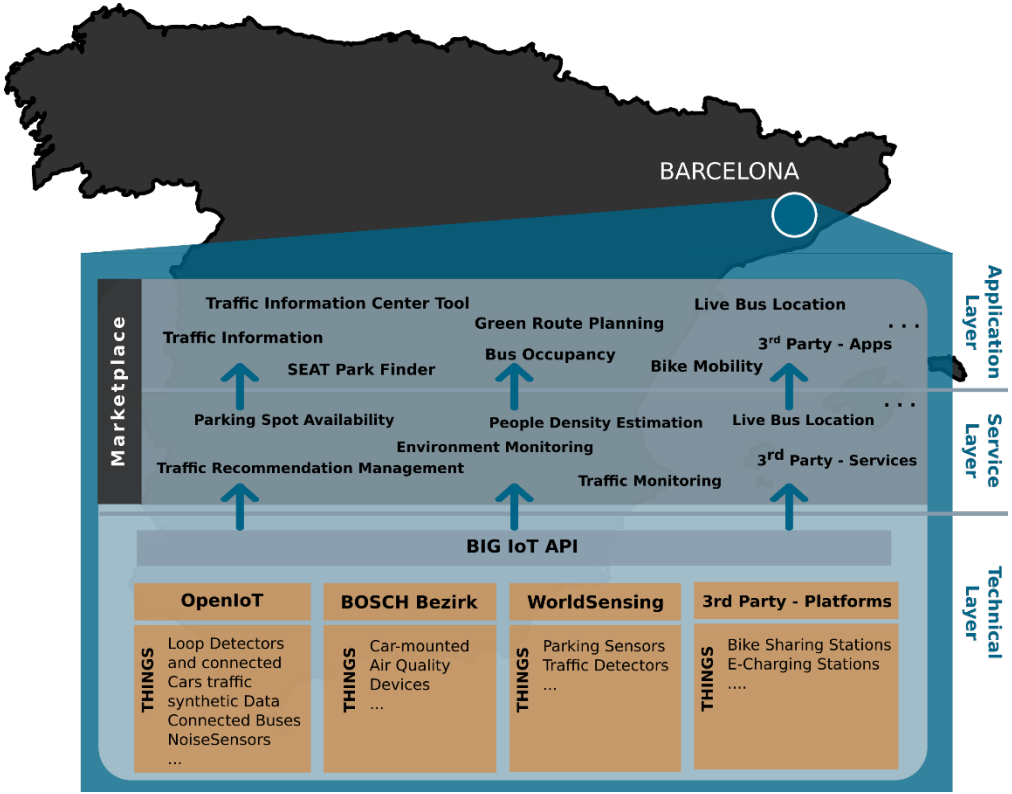


More information: Developer Guide



Barcelona Pilot

Barcelona Pilot



Use Case Clusters Barcelona

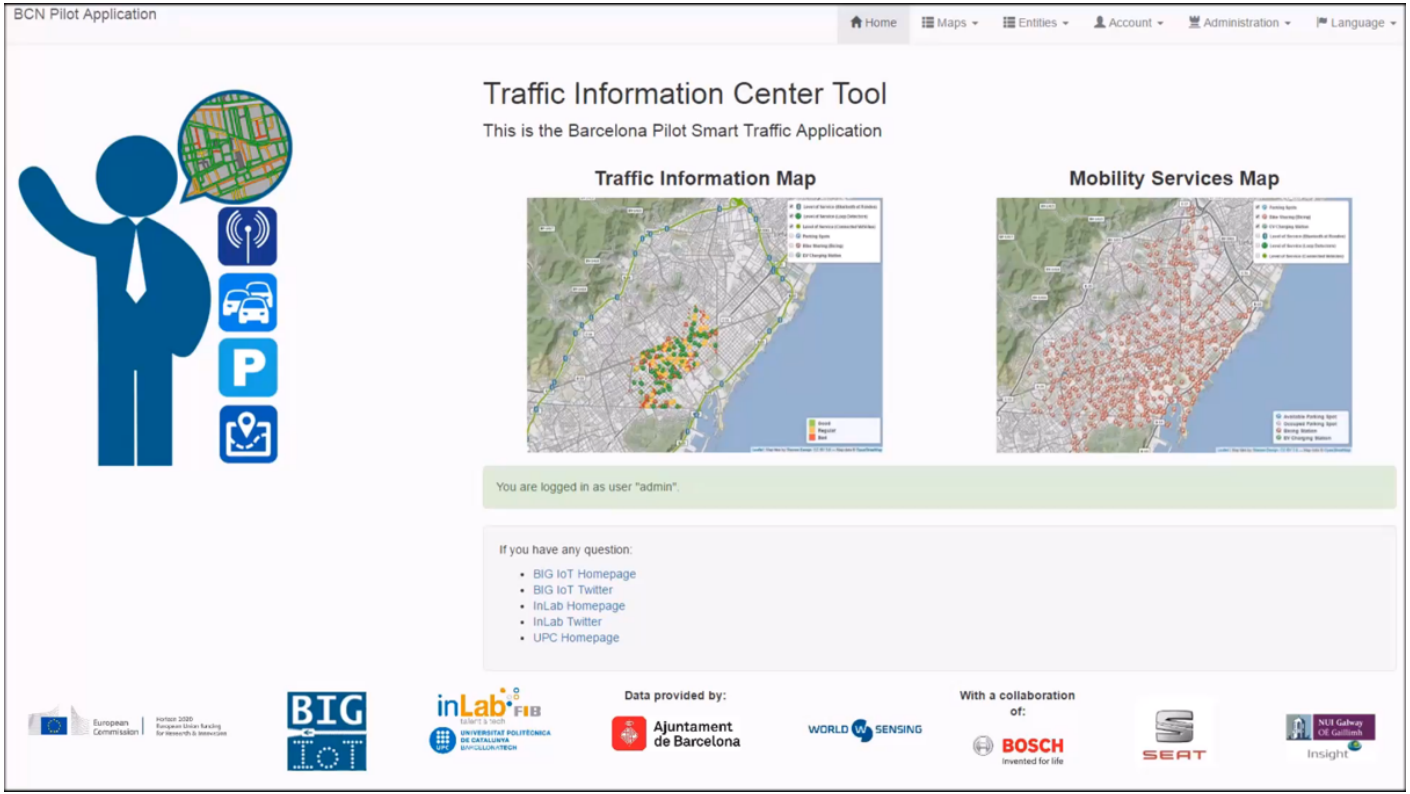
Use Case Cluster	Northern Germany	Barcelona	Piedmont
Smart Parking			
Smart Traffic Management			
Public Transport Optimization			
Bike Mobility			
Incentive-based Green Route Planning			
Multi-Modal Route Optimizer			
Smart Charging			
Device-to-Device Communication			

Smart Traffic Management

On the basis of **traffic and environment monitoring** (e.g., air quality sensors on connected cars or noise detectors), traffic recommendations will be supported to improve traffic conditions and minimize emissions caused by traffic jams, and waiting times.

- **Applications:** Traffic Information Center tool, Traffic Information to Citizens
- **Services:** Traffic monitoring, Environmental monitoring, Traffic Recommendations
- **Smart Objects:** Bluetooth and Magnetometers detectors, SEAT Cars Air Quality sensors, Simulated Data, Noise detectors
- **Platforms:** Open IoT, Bosch BEZIRK, Worldsensing, Sentilo

Barcelona Pilot – Traffic Information Center Tool



Smart Parking

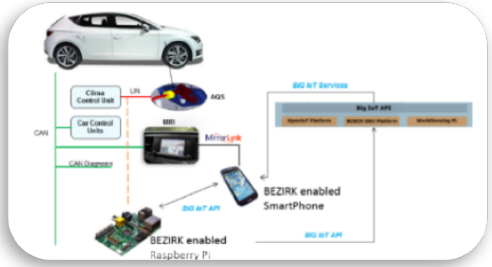
Effective **navigation to parking spots** based on availability and distance, taking into account the current traffic conditions and parking prices.

- **Application:** SEAT ParkFinder
- **Services:** Parking Spot Availability Service **Platforms:** WorldSensing FastPark
- **SmartObject:** Parking Detectors (WorldSensing/FastPark Platform)
  - Real-time accces to 500 availability sensors in Les Corts area in Barcelona

Incentive-based Green Route Planning

Usage of air quality an noise monitoring across the city in order to plan routes for cars in an environmental friendly manner. Participants will be **incentivized to follow green routes by car or use alternative means** (i.e. public transport or bikes).

- **Application**: Green Route Planning App
- **Services**: Traffic monitoring, Environment monitoring, Traffic Recommendations Service,…
- **Smart Objects:** Noise detectors, Bluetooth and Magnetometers detectors, SEAT Cars Air Quality sensors
- **Platform:** OpenIoT, BOSCH, WorldSensing
- **Other services:** Access to TMB services



Barcelona Pilot - Overview

Barcelona Pilot Use Cases	In collaboration with
Smart Parking	WorldSensing, **Barcelona City Council,** other external stakeholders
Smart Traffic Management	WorldSensing, **Barcelona City Council**
Incentive-based Green Route Planning	WorldSensing, **Barcelona City Council**, TMB (data provider)
Public Bus Optimization (NEW!)	TMB
Bike Mobility (NEW!)	**Barcelona City Council**
Smart Charging (NEW!)	**Barcelona City Council**

SEAT

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

BOSCH Invented for life

OÉ Gaillimh NUI Galway

Barcelona Pilot

- Using infrastructure based traffic detectors to measure speed, car count and related parameters.
  - These detectors are provided by WorldSensing, who also provides parking spot sensors.
  - Seat provides air quality sensing devices on connected cars.

- Our IoT platforms provide access to connected buses, connected cars, over 500 street parking sensors, several road-side magnetometers control-stations, and 37 Bluetooth/Wi-Fi antennas in the city.

Barcelona Pilot

- **Access to Open Data and Barcelona City platforms** (such as SENTILO) will also be enabled through the BIG IoT API, giving access to
  - noise detectors
  - bike sharing data
  - e-charging stations
  - …

- We are using those *things* to implement mobility services and applications, such as a traffic information center tool, a smart parking app and green route planning.

Questions & Answers

Thank you for your attention!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BIG-IoT project group

Horizon 2020
European Union funding
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