Data Modelling as a basis for Smart City

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.. what makes an application be "smart"?

FIWA

Does this guy look really smart?

3

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Implementing Smart Solutions requires gathering and managing context information at large scale

Smart Cities

Shop
- Location
- Business name
- Franchise
- offerings

Citizen
- Birthday
- Preferenc
- Location
- ToDo list

Bus
- Location
- No. passengers
- Driver
- Licence plate

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What if ... *there were a standard API for accessing context information?*

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Existence of a Context Information Management standard brings the opportunity to share information across domains

Smart Waste **Smart Energy** **Smart Parking** **Smart Mobility** **Smart Home** **e-Government** **Sensor Data from Cities**

Standard API

standard Context Information Management layer

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Boosting the local ecosystem:
Entrepreneurs will benefit the opportunities of a larger market

"We can invest on development of solutions we don't have to adapt for each and every customer"

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Shared context information will boost innovative services and the development of the Economy of Data
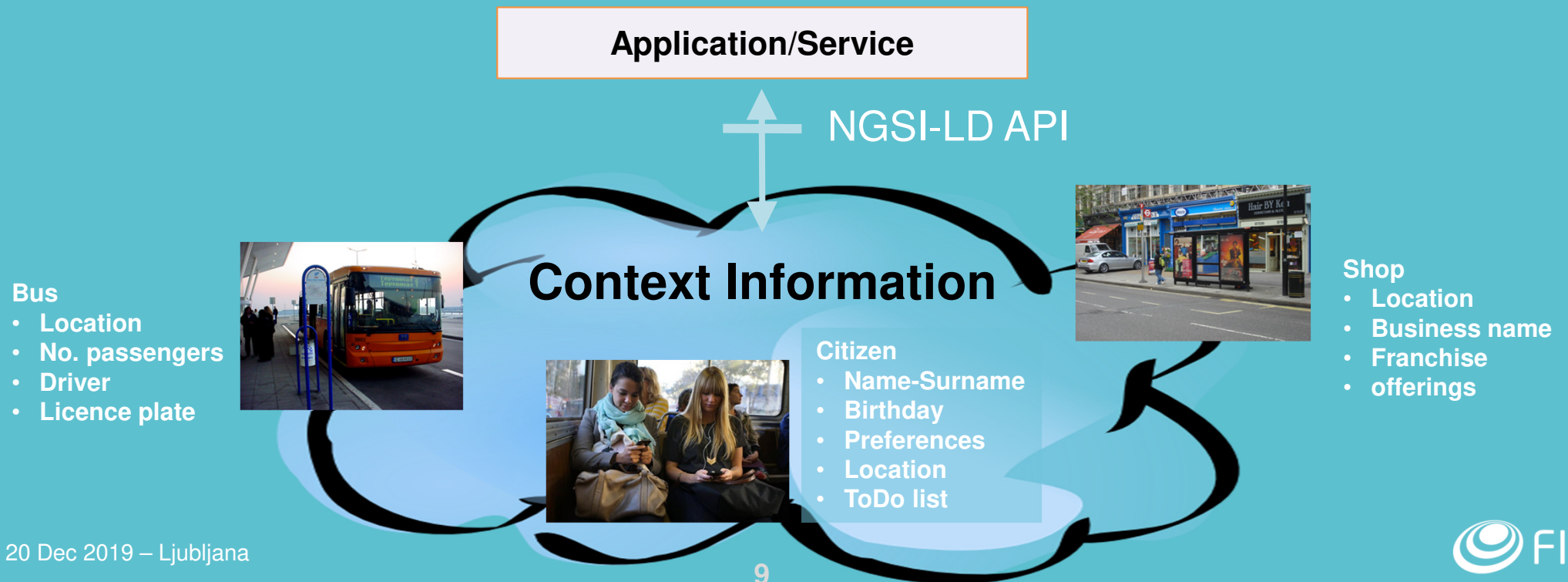
THE DATA ECONOMY

- Organizations in different domains could interchange data based on a common Context Information Management layer (**Data Models**)

- Authorization and Access Control Policies govern who can access what, when (**Sovereignty of Data**)

- Organizations may monetize the data they offer (**Economy of Data**)
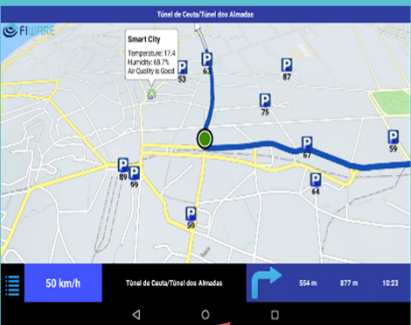
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Such standard API exist: NGSI-LD!

- NGSI-LD an open standard by ETSI for gathering, managing and providing access to context information describing what is going on in the context of reference at the right-time

- NGSI-LD is simple (any web/backend programmer gets quickly used to it) yet powerful (geo-queries, support to JSON-LD for Linked Data, extendibility, …), and is a Restful API
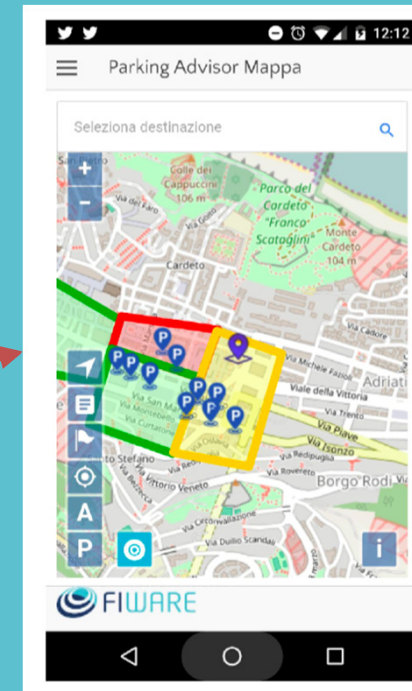
Application/Service

NGSI-LD API

Context Information

Bus
- **Location**
- **No. passengers**
- **Driver**
- **Licence plate**

Citizen
- **Name-Surname**
- **Birthday**
- **Preferences**
- **Location**
- **ToDo list**

Shop
- **Location**
- **Business name**
- **Franchise**
- **offerings**

A shared context!

City of Porto

City of Santander

City of Ancona

NGSI-LD
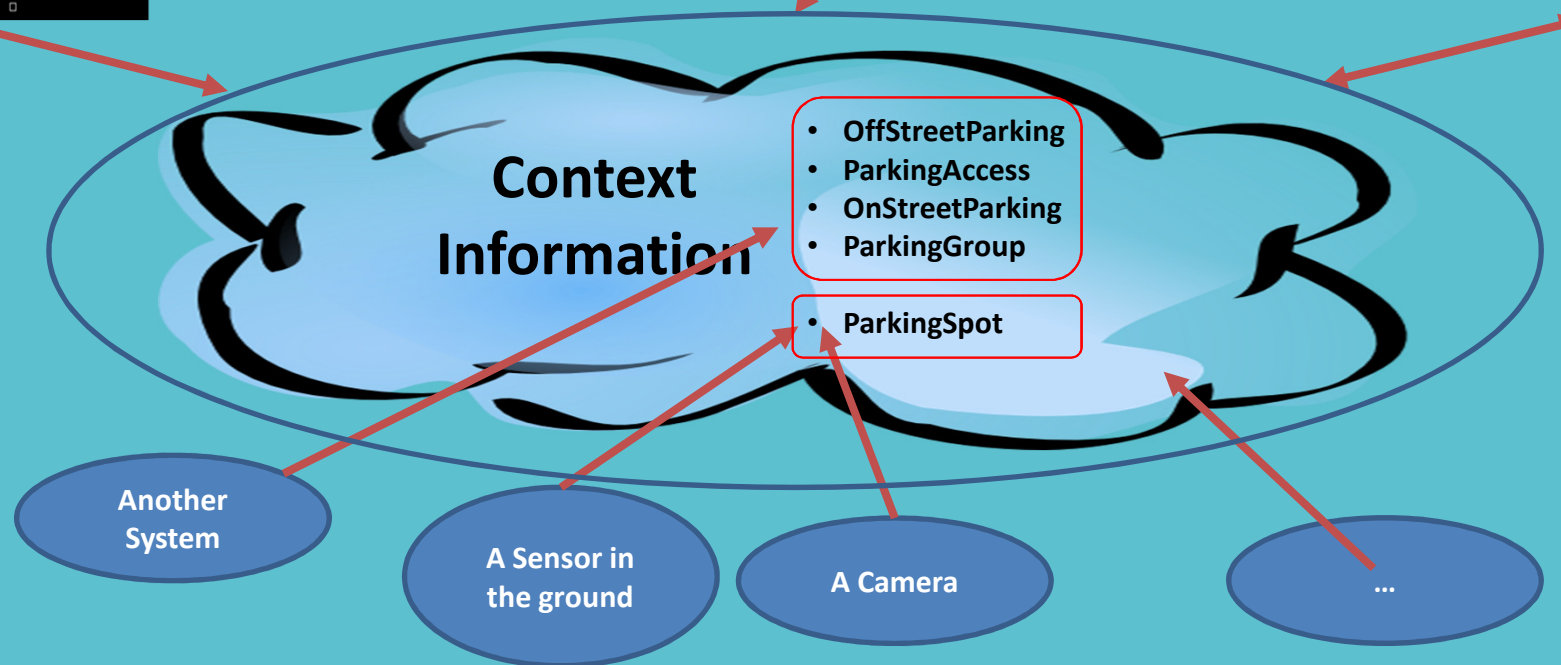
Context Information

- **OffStreetParking**
- **ParkingAccess**
- **OnStreetParking**
- **ParkingGroup**

- **ParkingSpot**

Another System

A Sensor in the ground

A Camera

...

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A smart city app: https://smartdata.wien/
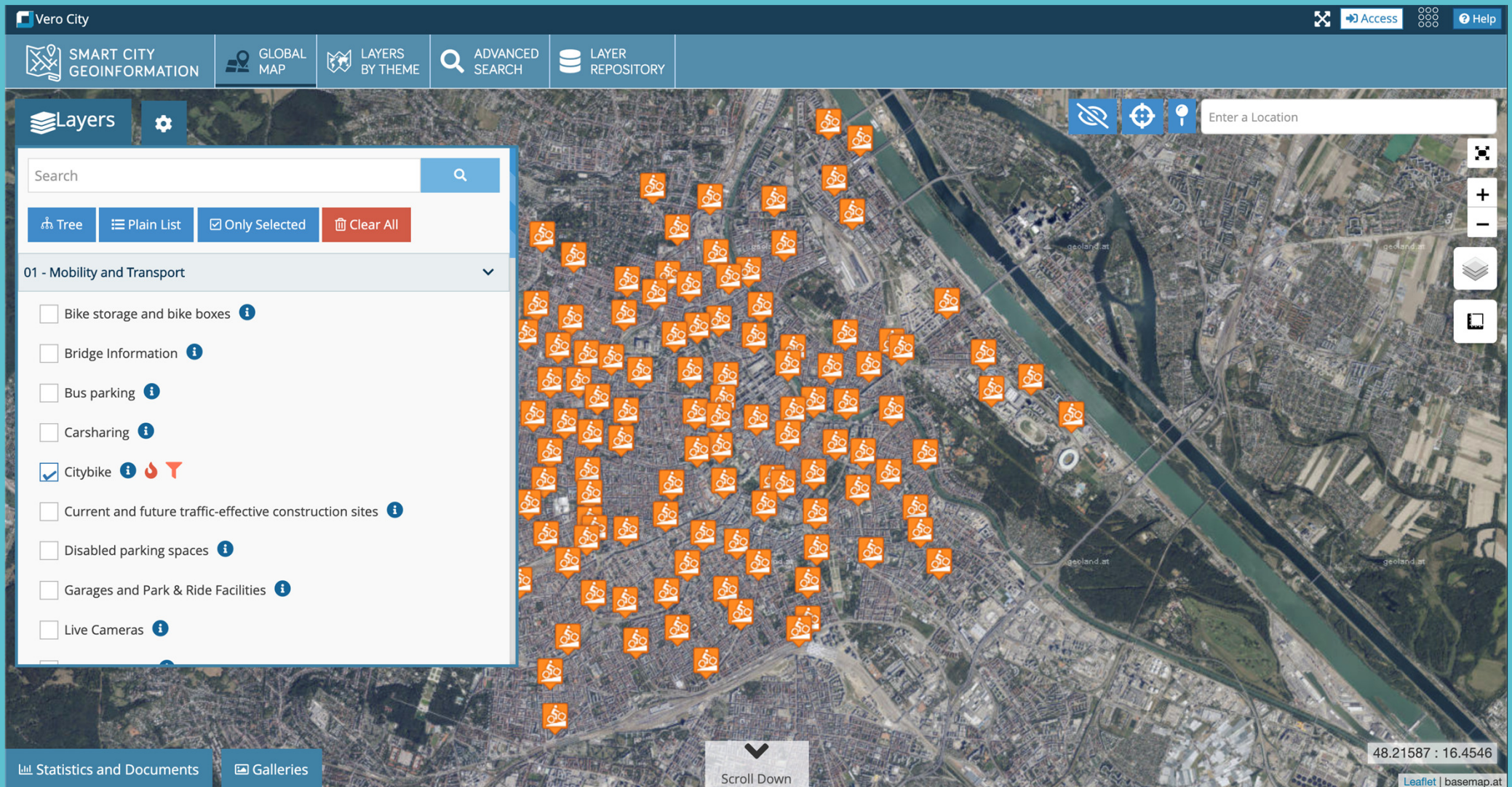
FIWARE: The Open Source platform of choice for building smart solutions

Smart Solutions gather data from many different heterogeneous sources (including IoT) to build a "picture" of the real world and then process and analyse that information in order to implement the desired intelligent behavior (which may imply changing the real world)

Capture

Data = Context Information

Actuate

Process

CONTEXT
MATTERS

FIW
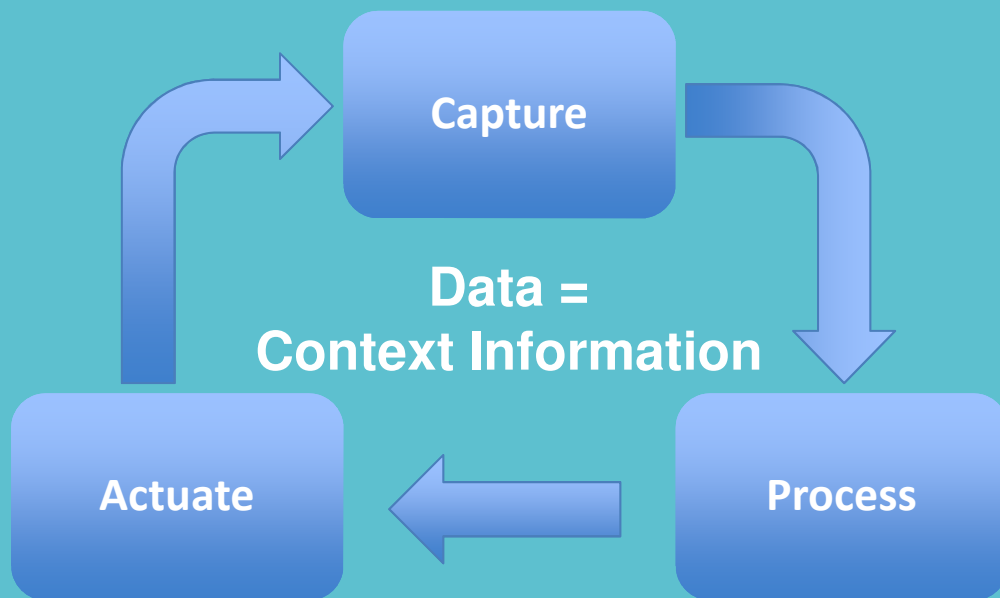
Around context information management, a lot of useful complementary FIWARE enablers can be used
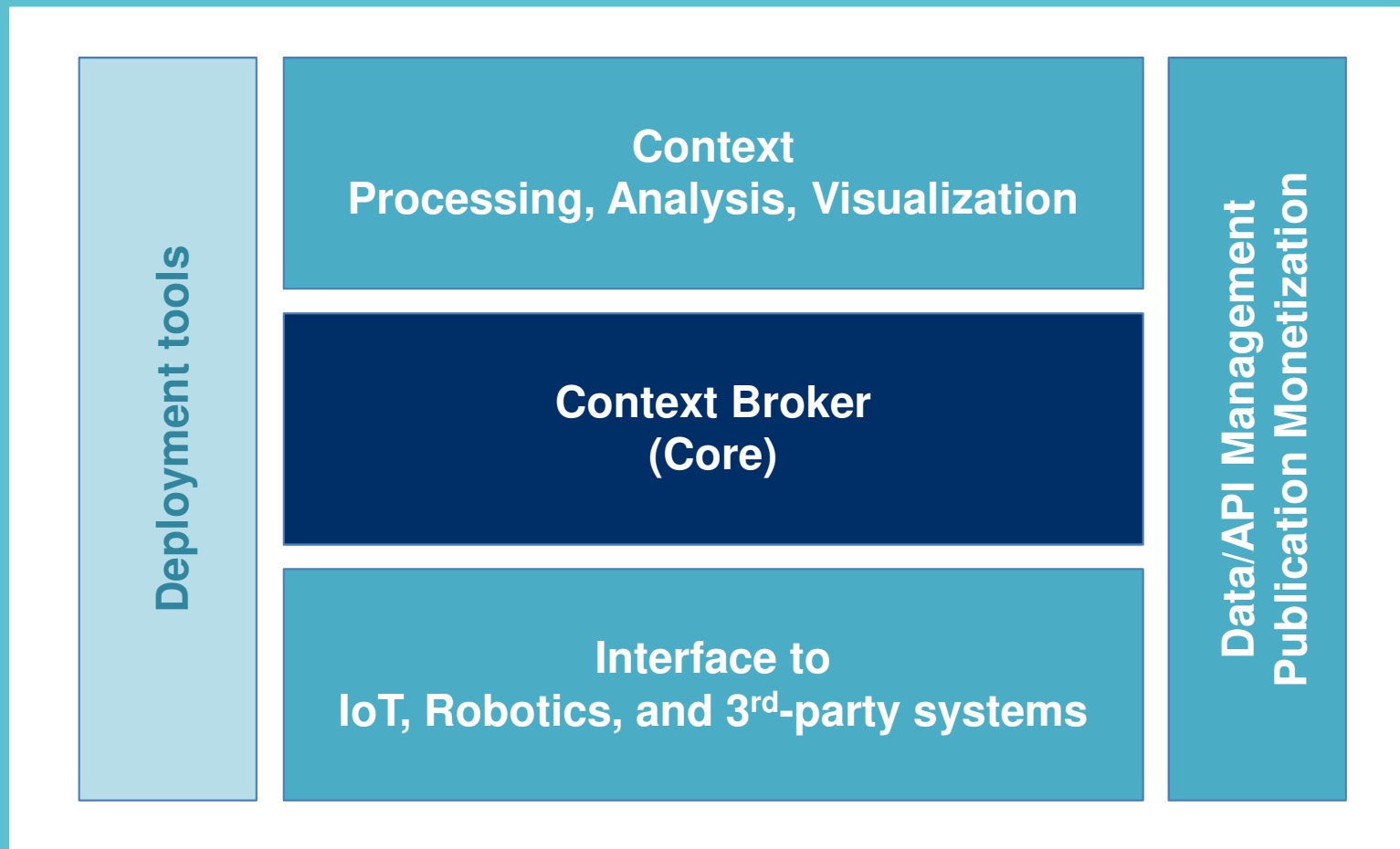
FIWARE

FIWARE for Smart Cities

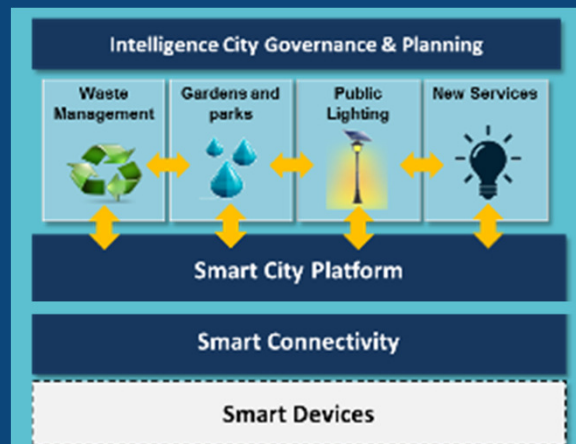# FIWARE: helping Smart Cities in their transformation journey

1 ---- **2** ---- **3** ---- **4**

ficient and Open

- tical solutions (some
g IoT-enabled) bringing
ciency in silos
- toric data as open data
- rmation still in vertical
s, no global picture

Truly Smart

- Horizontal platform gathering "right-time" context info from different vertical services
- Common information models
- Smart City Governance Solutions

Unleashing Right-time Open Data

- right-time context info published to third parties
- authorization and access control (API management)
- open innovation ecosystem

Support to Data Economy

- city as a platform includ also 3rd party data enab innovative business mo
- open and commercial d enabling multi-side mar

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Smart Cities: the start …

EFFICIENT & OPEN

- Vertical solutions (some being IoT-enabled) bringing efficiency in silos
- Historic data as open data
- Information still in vertical silos, no global picture

Yes!
A city may be already an Efficient and Open City ….

… but there is still a journey to travel to be where SMARTNESS is!
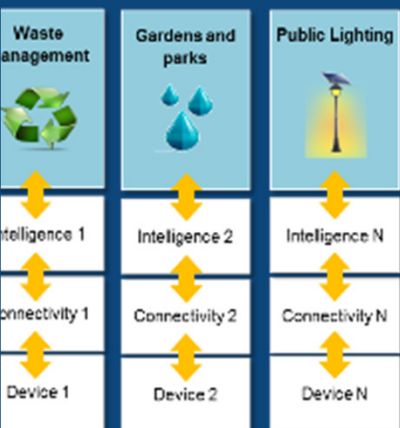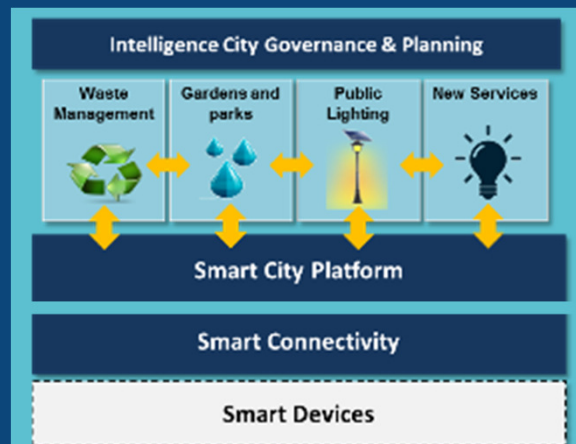
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Smart Cities: the transformation journey

1 ---------- 👣 ---------- **2**

fficient and Open

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Waste anagement	Gardens and parks	Public Lighting
♻	💧	💡
↕	↕	↕
telligence 1	Intelligence 2	Intelligence N
↕	↕	↕
onnectivity 1	Connectivity 2	Connectivity N
↕	↕	↕
Device 1	Device 2	Device N

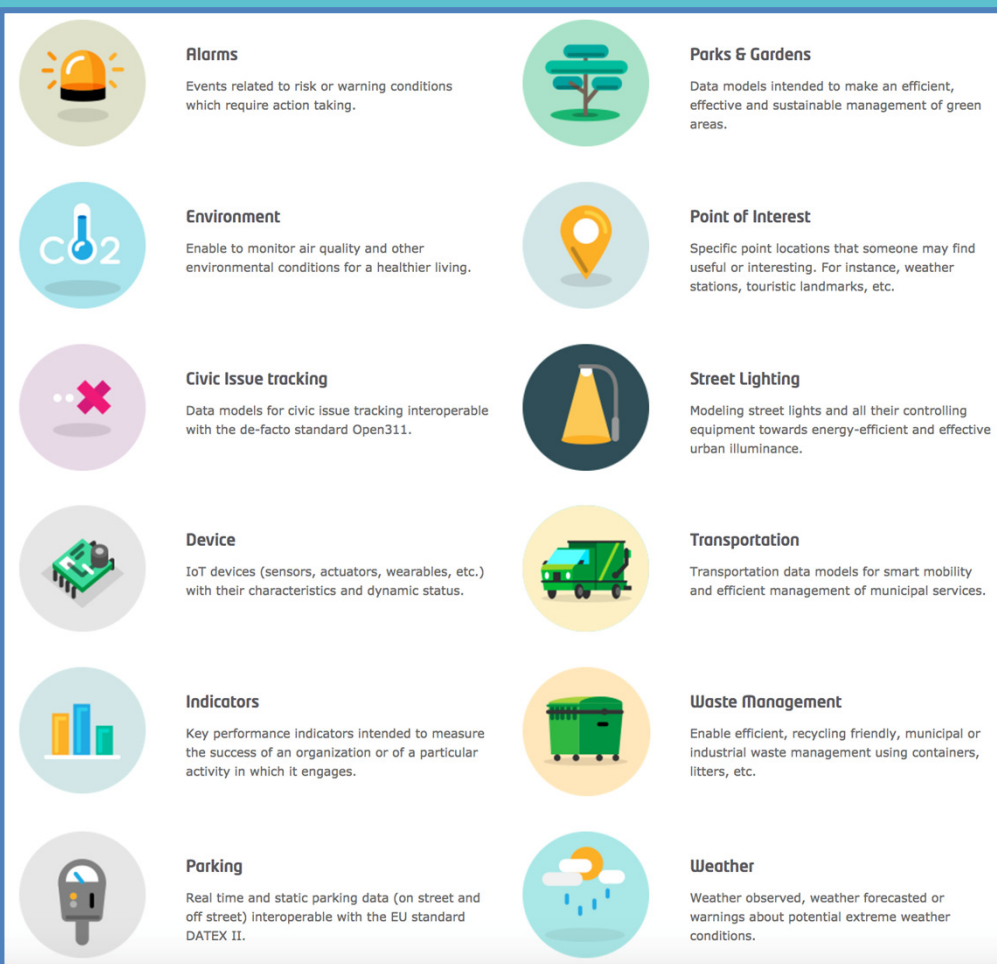## Truly Smart

- Horizontal platform gathering "right-time" context info from different vertical services
- Common information models
- Smart City Governance Solutions

Intelligence City Governance & Planning

Waste Management	Gardens and parks	Public Lighting	New Services
♻	💧	💡	💡

Smart City Platform

Smart Connectivity

Smart Devices

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Common Information Models for the City ecosystem

Alarms
Events related to risk or warning conditions which require action taking.

Environment
Enable to monitor air quality and other environmental conditions for a healthier living.

Civic Issue tracking
Data models for civic issue tracking interoperable with the de-facto standard Open311.

Device
IoT devices (sensors, actuators, wearables, etc.) with their characteristics and dynamic status.

Indicators
Key performance indicators intended to measure the success of an organization or of a particular activity in which it engages.

Parking
Real time and static parking data (on street and off street) interoperable with the EU standard DATEX II.

Parks & Gardens
Data models intended to make an efficient, effective and sustainable management of green areas.

Point of Interest
Specific point locations that someone may find useful or interesting. For instance, weather stations, touristic landmarks, etc.

Street Lighting
Modeling street lights and all their controlling equipment towards energy-efficient and effective urban illuminance.

Transportation
Transportation data models for smart mobility and efficient management of municipal services.

Waste Management
Enable efficient, recycling friendly, municipal or industrial waste management using containers, litters, etc.

Weather
Weather observed, weather forecasted or warnings about potential extreme weather conditions.
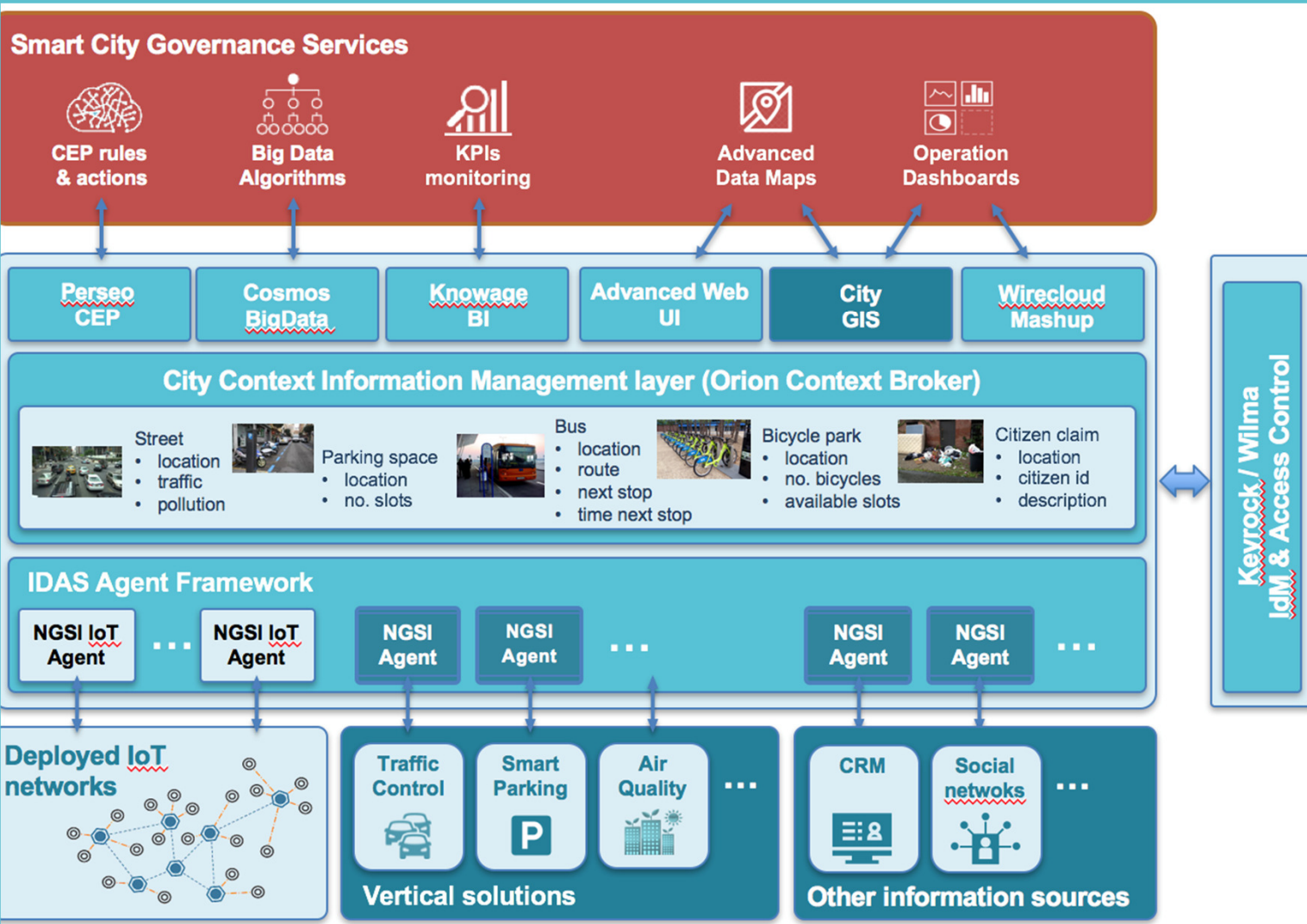
- Portable Governance Solutions

- Vertical solutions more easy to plug or replace

- Sharing of best practices between cities made easier

- Smart Cities as a market where it will be more attractive to invest

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Smart Cities Architecture by FIWARE

Legend:
- FIWARE compo[nent]
- Third party sy[stem]
- Services on to[p]

- Breaking vertical silos, bu[ilding] a Context Info Manageme[nt] layer that provides a holis[tic] picture of what is going o[n in] the city

- Interoperability between verticals

- Merging data from:
  - vertical solutions
  - IoT networks
  - processing/analysis

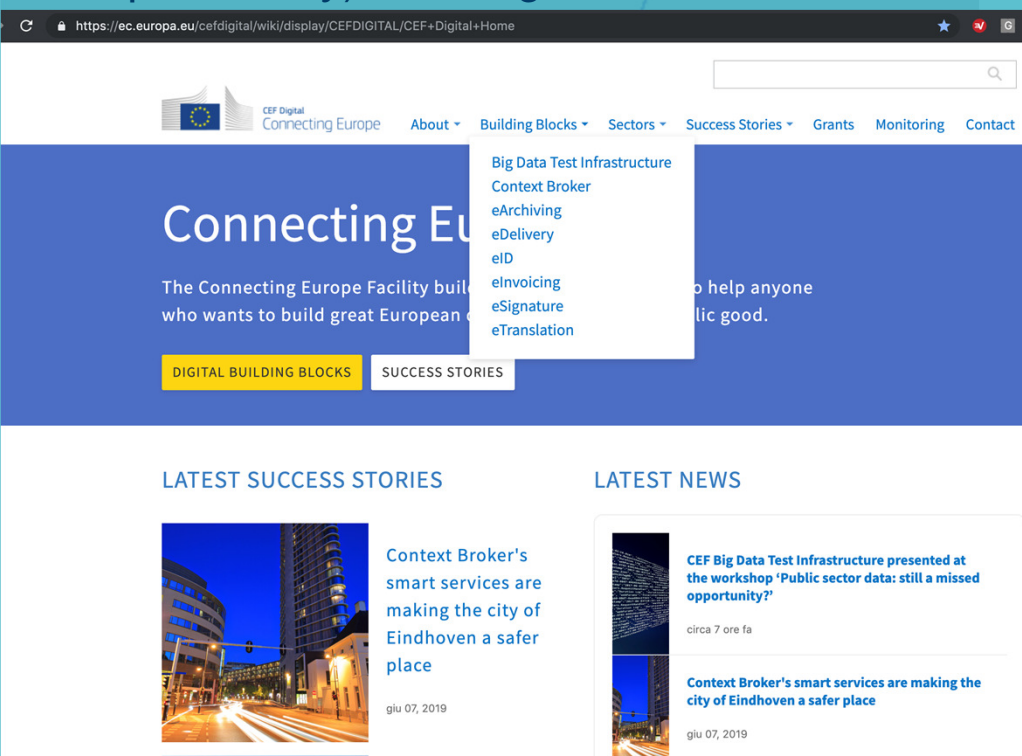- Bringing the enablers to process and analyze right-time and historic con[text] data at large scale

FIWA[RE]

FIWARE: a standard *de-facto …*

NGSI-LD and **Context Broker**
Technology have been endorsed on
Feb. 5th, 2018 as new CEF (Connecting
Europe Facility) Building Blocks

140+ cities
30+ countries

- Common APIs
- Context Information
- Open Data Platform
- Driven by implementation approach
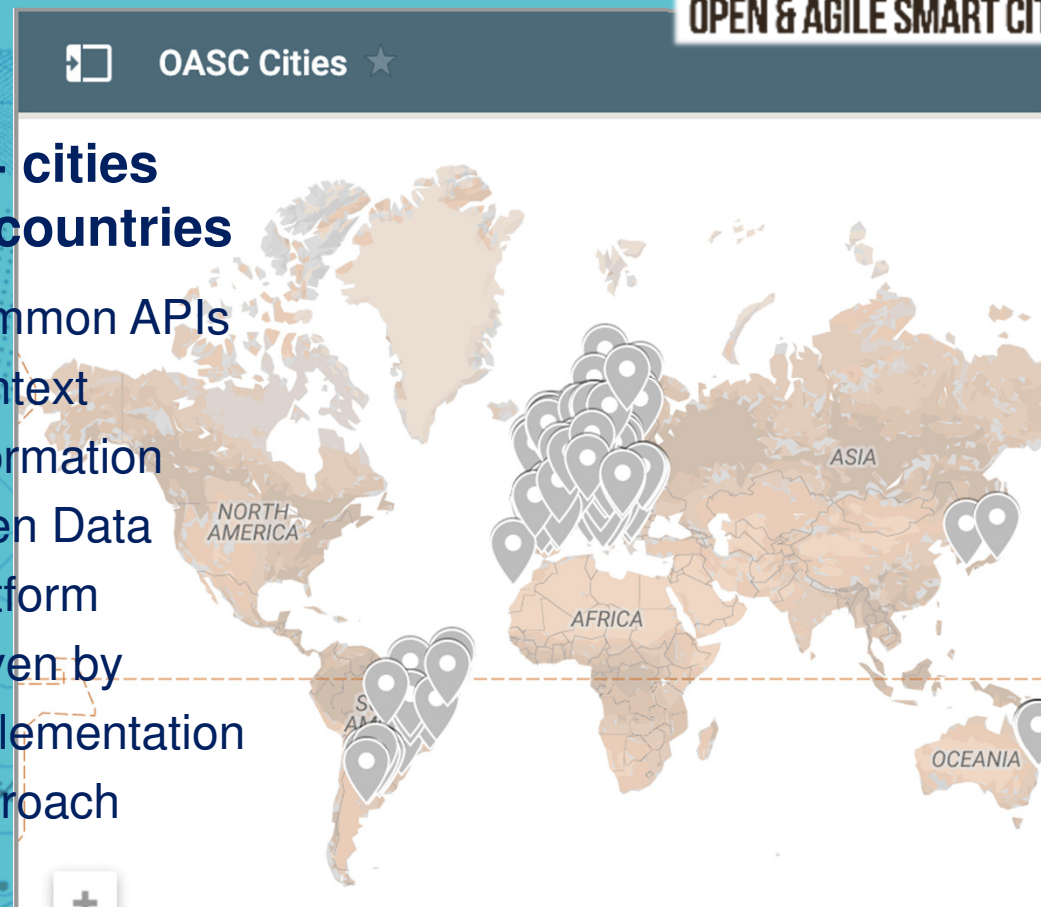
.. a real standard: Standardization on a global scale

FIWARE Standardization:

FIWARE has been recognised as key contributor for the IoT-Enabled Smart City Framework. Such initiative is led by NIST

The ETSI ISG CIM has decided to give the name "NGSI-LD" to the Context Information Management API. The rationale is to reinforce the fact that this specification leverages on FIWARE NGSIv2 to incorporate the latest advances from Linked Data.

- Reference Architecture
- Common Information Models
- Paving the way towards transforming cities into platforms enabling the Data Economy

Smart Cities: the transformation journey
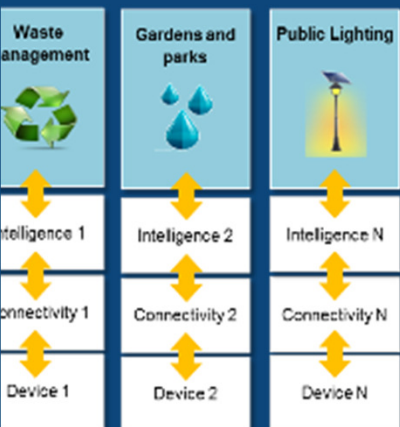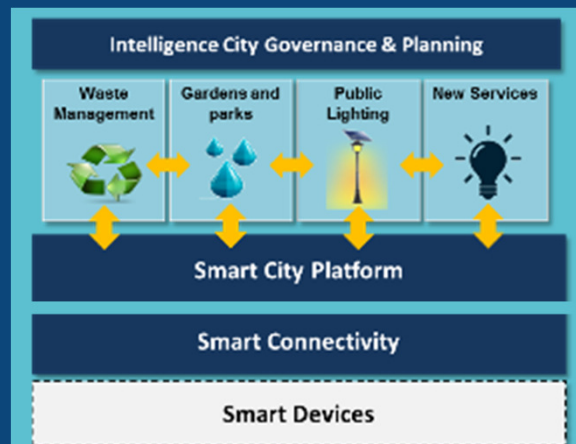
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Smart Connectivity

Smart Devices

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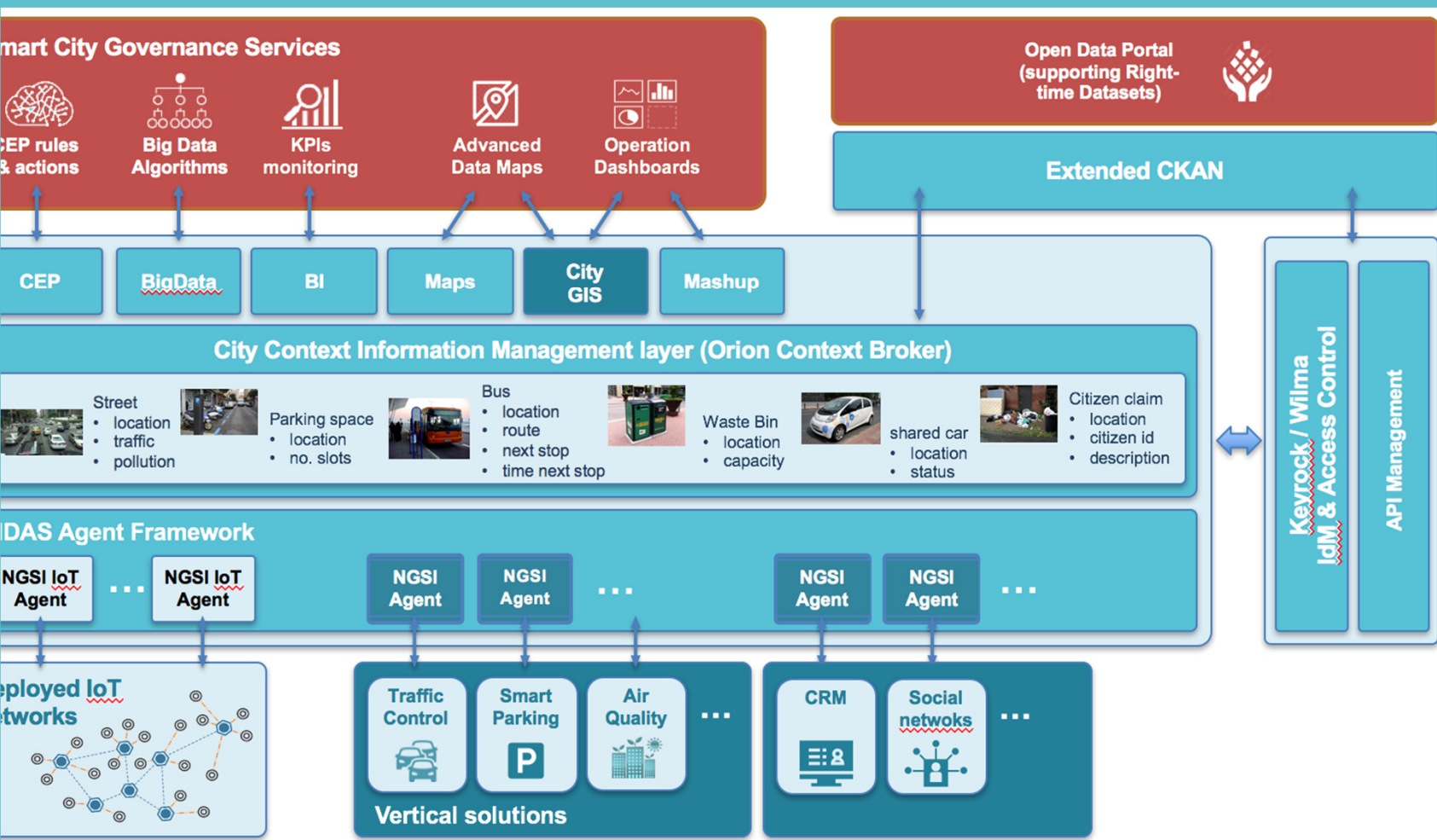- open innovation ecosystem

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.. part of the City Context Information is available in "right-time" to third parties

- Unleashing the potential or right-time Open Data

- Open Innovation ecosystem on shared data

- Smart Cities as an attractive market for entrepreneurs

FIWARE

FIWARE: Unleashing the potential or right-time Open Data

- Supporting publica... of "right-time datas... mapping to FIWAR... NGSI queries on Context Broker lay...

- Ability to manage acquisition of acce... rights on published resources (datase...

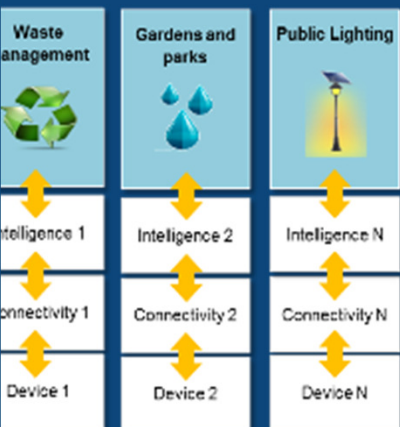- Interface with user... and developers to gather feedback o... published resource...

Smart Cities: the transformation journey

① ---- 👣 ---- **②** ---- 👣 ---- **③** ---- 👣 ---- **④**

fficient and Open

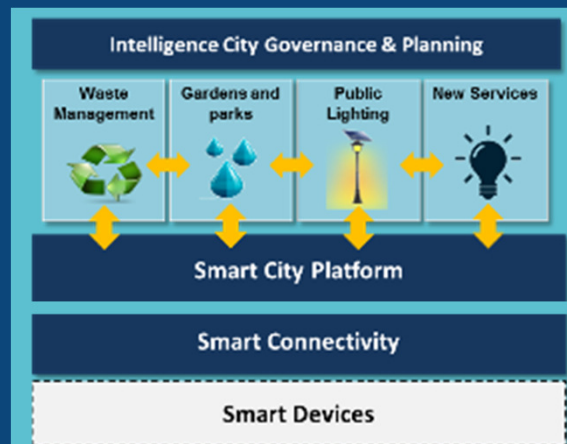- tical solutions (some
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FIWA

.. Data platform make Cities the owner of their data

- The City as an enabler of the Data Econom
- The City can capture additional data (from others), which may turn into better insights
- FIWARE brings extensions to CKAN (most widely used Open Data platform) turning it into a Data Marketplace
  - Context API queries as "right-time" datase
  - Managing of Access Rights acquisition
  - Binding pricing to datasets (price for rights acquisition and pay per use)

FIWARE: enabling the Economy of Data
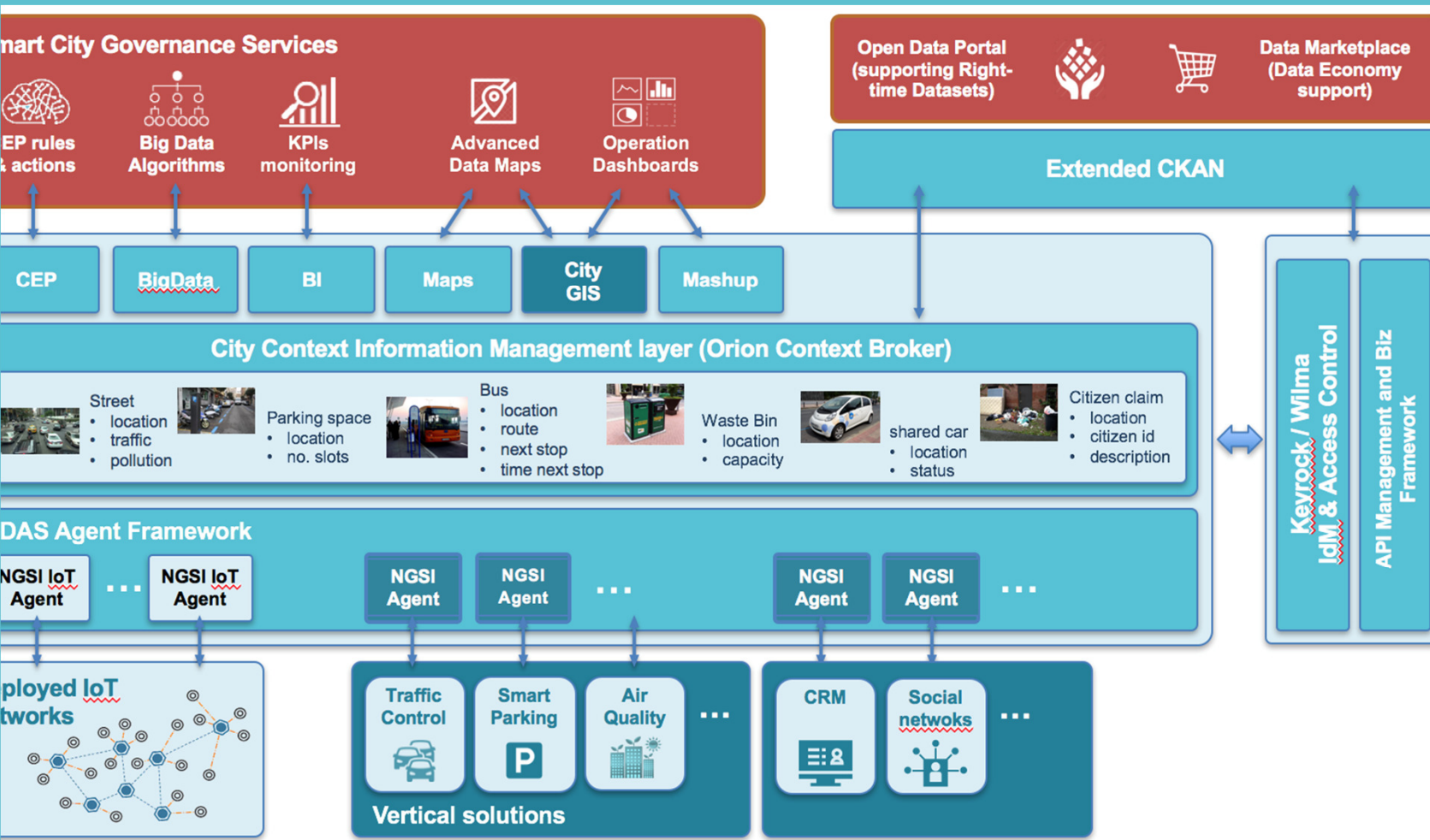
- Enabling publicatio resources by third parties

- Ability to assign pr to the acquisition access rights and definition of pay-p use schemas

- Biz Framework managing offering based on Open TMForum APIs

FIWARE FOUNDATION

FIWARE Foundation Mission

Overall FIWARE Mission

To build an open sustainable ecosystem around public, royalty-free and implementation-driven software platform standards that will ease the development of new Smart Applications in multiple sectors.

FIWARE Foundation

The FIWARE Foundation is a legal independent **non for profit charitable** body providing shared resources to help to achieve the FIWARE Mission by Empowering, Promoting, Augmenting, Protecting, and Validating the FIWARE technologies and the whole Community around them.

FIWA

The FIWARE Foundation has been grown as 300+ global members within 3 years!

Individual Members: 208

FIWARE: Technology but much more

Mission: build an open sustainable ecosystem around public, royalty-free and implementation-driven software platform standards that will ease the development of new Smart Applications in multiple sectors

Pillars:

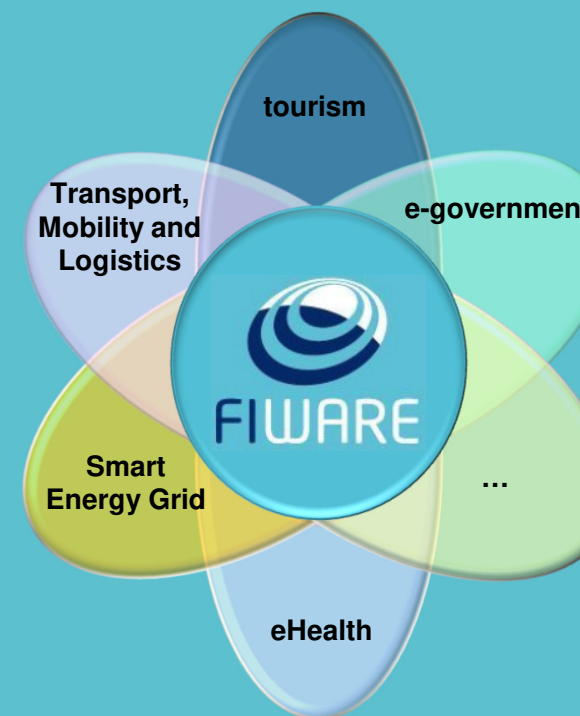|	
FIWARE	the open source platform of choice for developing smart applications
FIWARE Lab	a meeting point where innovation happens and users can experiment with the technology
FIWARE Accelerate	activate funds and accelerate the business of entrepreneurs using the technology
FIWARE Mundus	reach a global footprint, opening to regions that share the same vision and ambition
FIWARE iHubs	support development of the community at local level, bringing support, training, certification

tourism

Transport, Mobility and Logistics

e-government

Smart Energy Grid

FIWARE

...

eHealth

Yes WE'
OPEN

Summary

Smart Cities materialize through:

A scalable platform to access and manage heterogeneous context information at the right time

A real-time open publish/subscribe mechanism and policies

A standard for exchange context information enabling a true ecosystem

Cities believing that Data is the source of Economy exploiting a virtuous circle for the benefit of all citizens

Thank you!

http://fiware.org
Follow @FIWARE on Twitter

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