



Orchestrating a brighter world

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Internet of Things – from Smart Things to Smart Nations

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Presentation at the Japan-EU
Symposium on ICT Research and Innovation



Smart Machines: Sensing, Analyzing, Understanding, Reacting ...

Co-Creation of IoT services



Cloud M2M Platform

Local Application



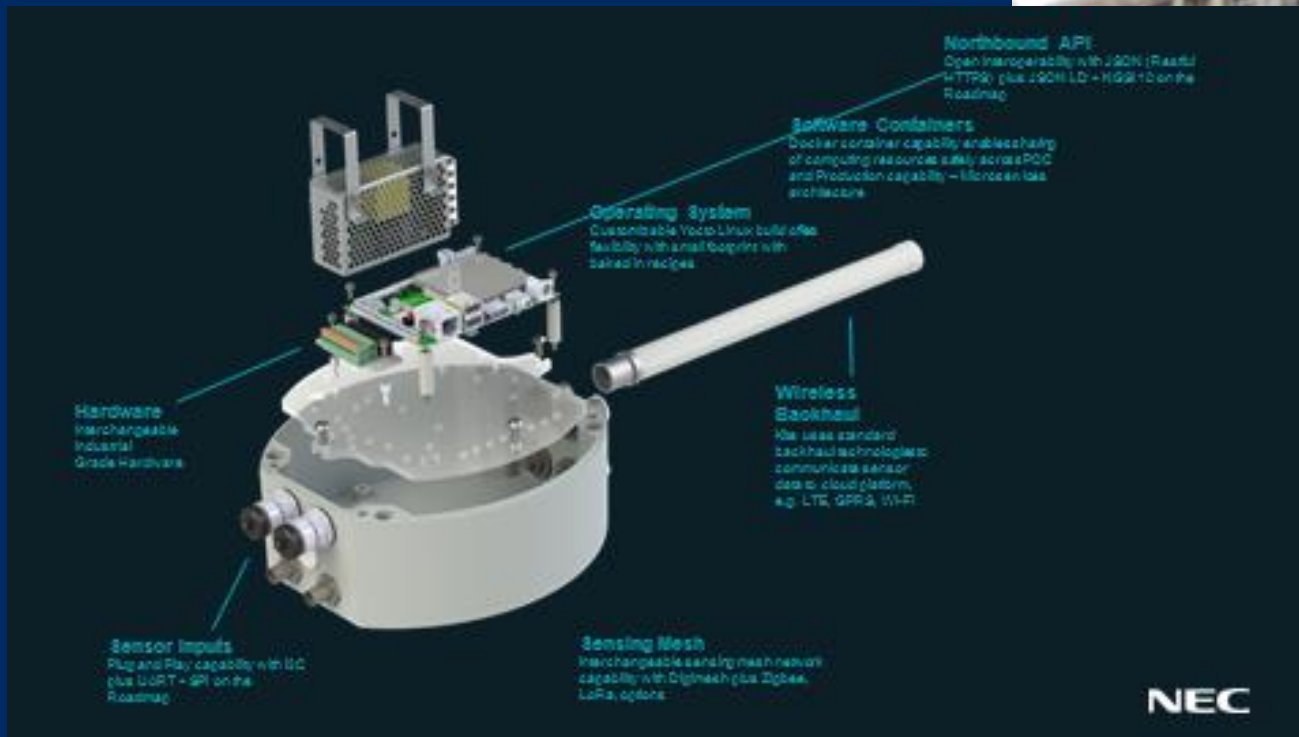
3rd Party Sensors & Actuators

Application Creator & Device Manufacturer

simply add IoT capabilities to your product

Measure the Health of a City

a Fitness Tracker for Smart Cities



 **FIWARE**
OPEN APIs FOR OPEN MINDS

enabled product

| Count | Category | Value |
|-------|----------|-------|
| [1] | CAR | 103 |
| | BIKE | 23 |
| [2] | CAR | 100 |
| | BIKE | 0 |
| [3] | CAR | 37 |
| | BIKE | 1 |
| [4] | CAR | 430 |
| | BIKE | 14 |
| [5] | CAR | 100 |
| | BIKE | 0 |
| [6] | CAR | 384 |
| | BIKE | 12 |



Empowered by Innovation

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**Absolutely
Positively
Wellington**

My Sites 0 demo

Showing

Visualizations

Graphic
 Map
 Table

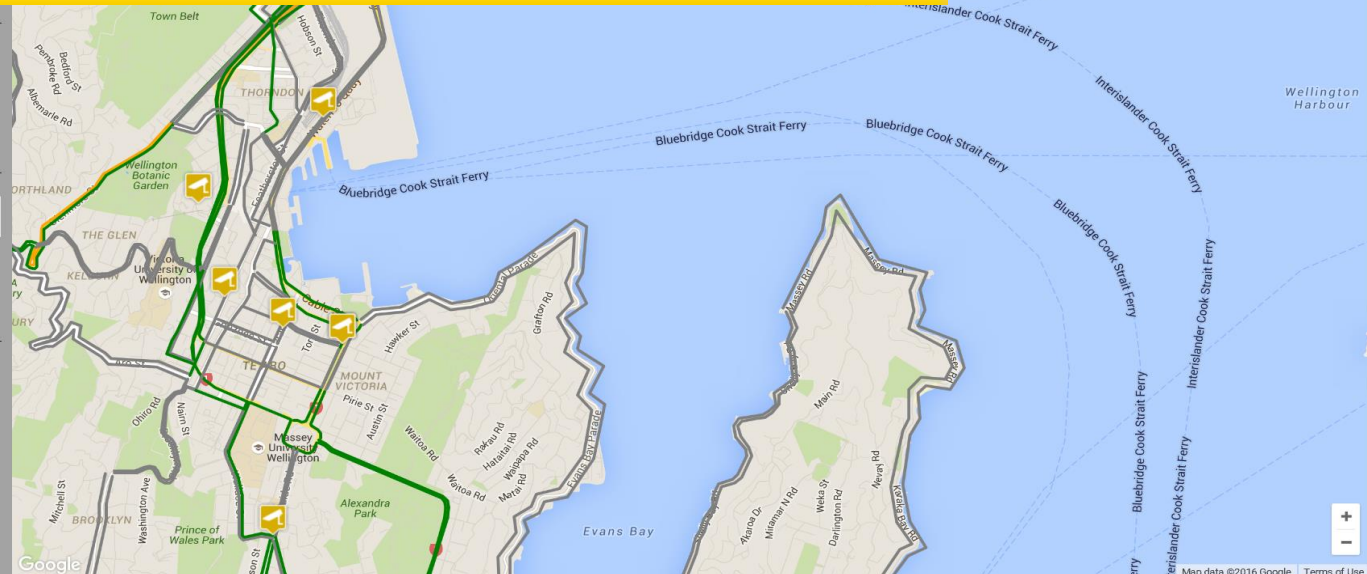
Historical

From:
To:

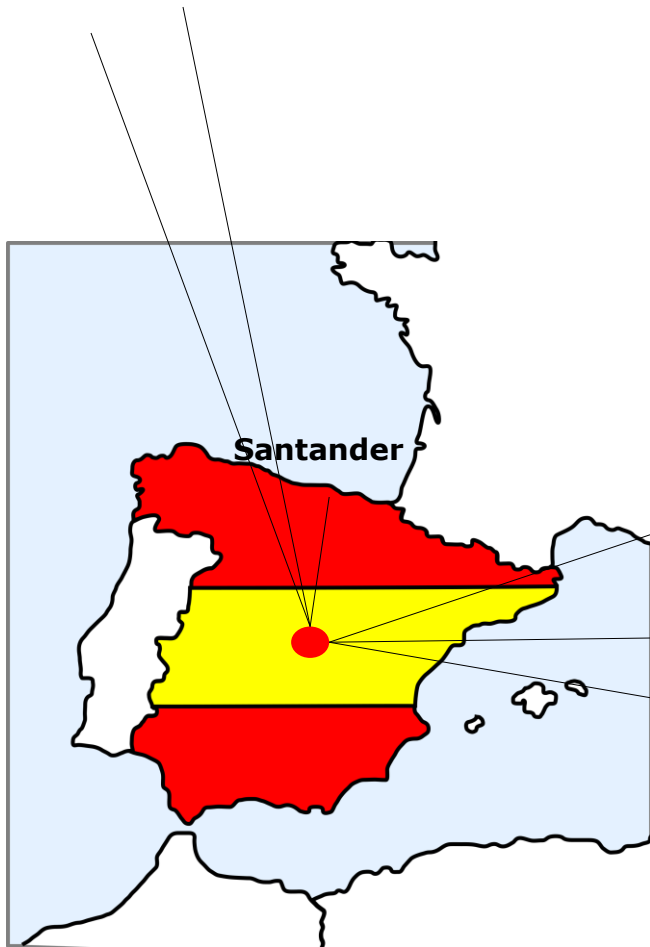
Historical

Grouping

Wellington
 Suburbs



Global IoT Services



Imagine a Digital Skin on our Planet

A real INTERNET of Things



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FIWARE: The Future Internet PPP

NEC Laboratories Europe (NLE)

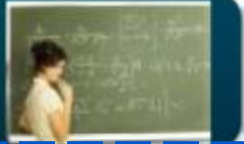
FIWARE Chapter

Cloud



- Federation of infrastructures (private/public regions)
- Automated GE deployment

Data/Media Context Mgmt



- Complete Context Management Platform
- Integration of Data and Media Content

IoT Services Enablement



- Easy plug&play of devices using multiple protocols
- Automated Measurements/Action \leftrightarrow Context updates

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Data/Services Delivery



- Visualization of data (operation dashboards)
- Publication of data sets/services

Advanced Web UI



- Easy incorporation of advanced 3D and AR features
- Visual representation of context information

Security



- Security Monitoring
- Built-in Identity/Access/Privacy Management

I2ND



- Advanced networking (SDN) and middleware
- Interface to robots



FIWARE

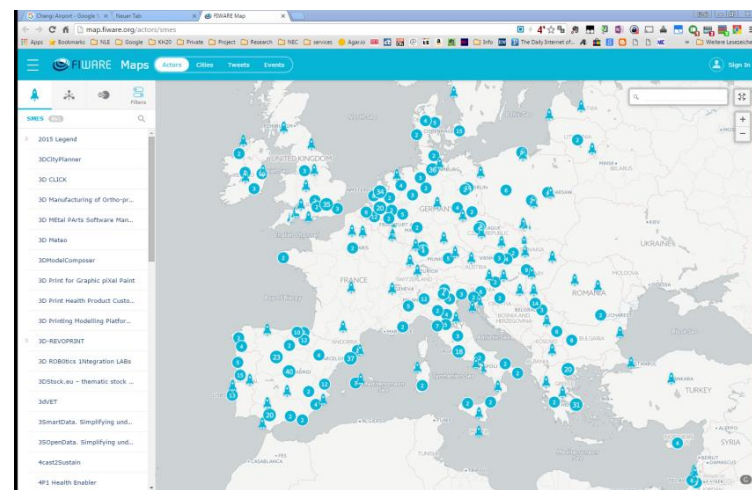
- Europe's Platform for the Digital Transformation
- Plug&play components & platform for Clouds, Mobile, IoT, and Web




NEC's Contribution

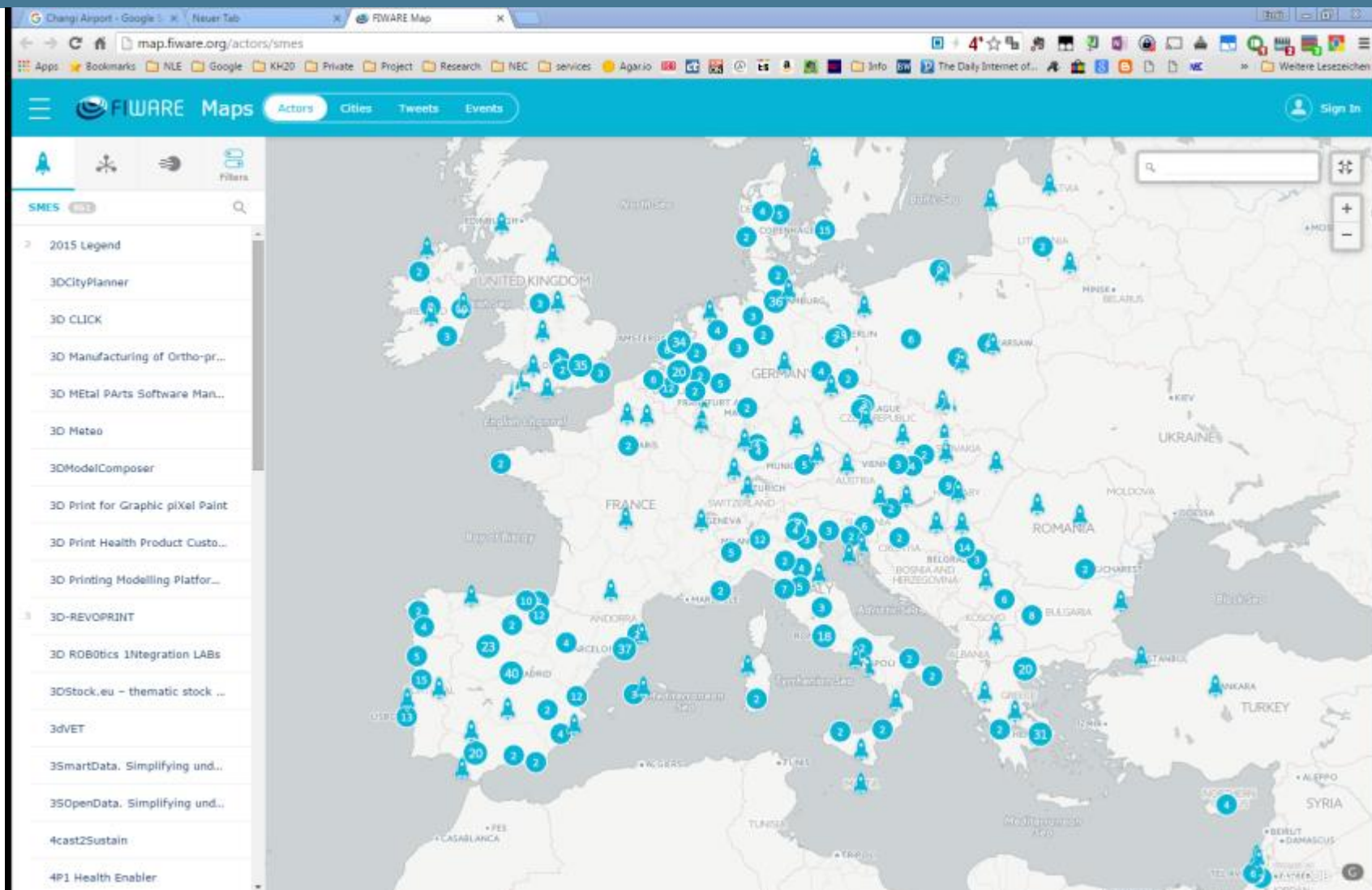
- **Core APIs:** OME NGSI as message and event bus for contextualized information
- **IoT Platform:** a global scale broker for IoT and Context information + semantic modelling of the real world
- Base for NEC's Smart City products

NEC **FIWARE Cloud** deployed in Santander, Wellington, Christ Church, Auckland, and two British cities



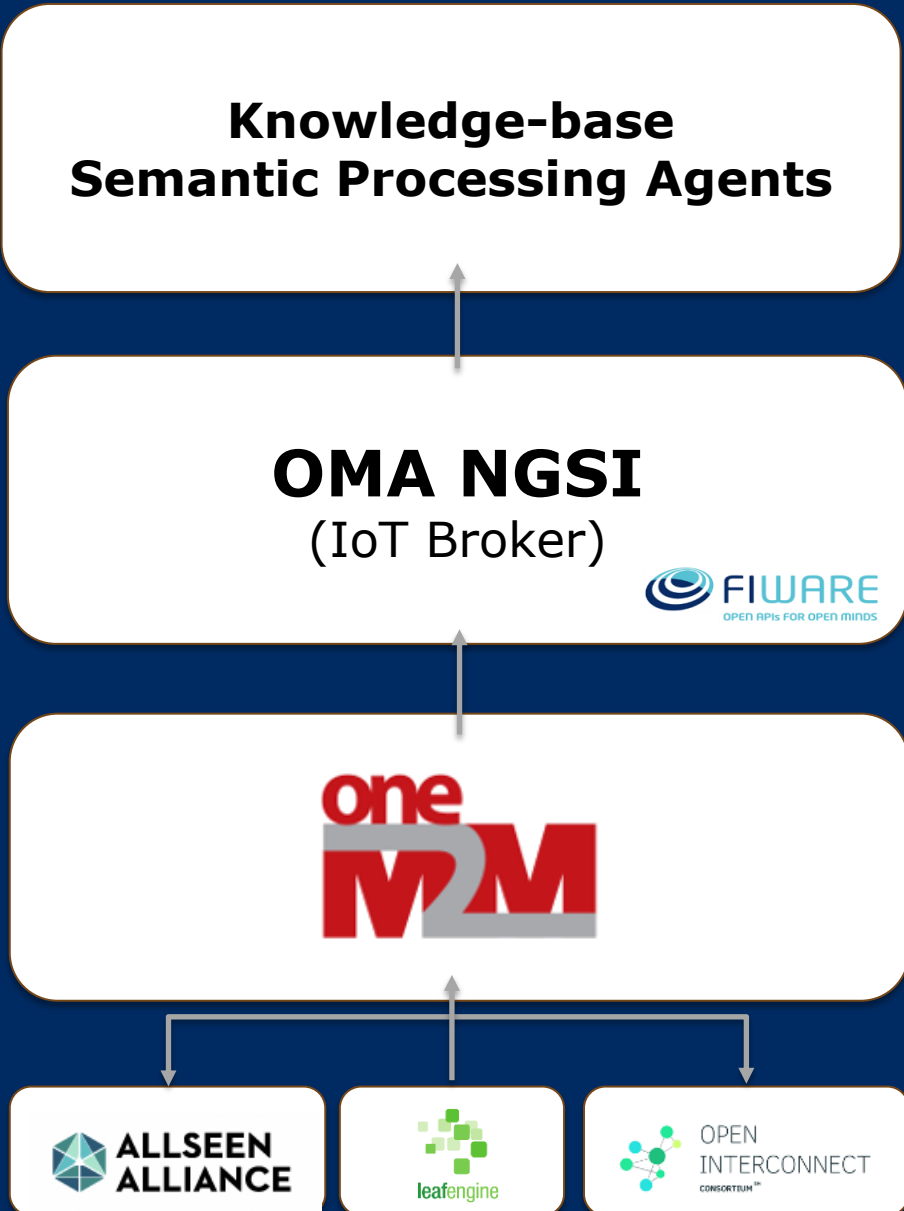
 **FIWARE:** 861 SMEs, 18 iHubs, 16 Accelerators, 89 Cities, 21 Labs
OPEN APIs FOR OPEN MINDS

FIWARE - Impact



861 SMEs, 18 iHubs, 16 Accelerators, 75 Cities, 21 Labs

Emerging IoT Protocol Stack



Data Integration

- across many systems
- Semantic Representation
- Semantic Mediation

IoT Entities

- Contextualized Information
- Content-based Queries
- Pub / Sub

IoT Integration Layer

- IoT Resources: Black Box Container
- REST-based Access

IoT Development System

- SDK
- OS Integration
- IoT Hardware



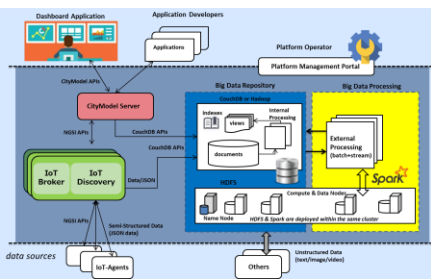
Orchestrating a brighter world

NEC brings together and integrates technology and expertise to create the ICT-enabled society of tomorrow.

We collaborate closely with partners and customers around the world, orchestrating each project to ensure all its parts are fine-tuned to local needs.

Every day, our innovative solutions for society contribute to greater safety, security, efficiency and equality, and enable people to live brighter lives.

Outlook: Future Technology Trends



IoT Clouds [today state-of-the-art]

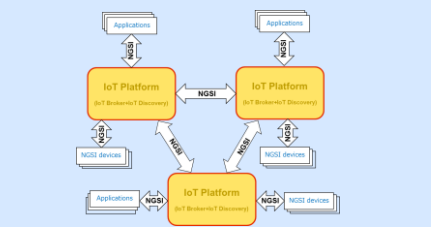
- Cloud-based provisioning of IoT services
- NEC product: Cloud City Operation Center

Today

Elastic IoT [emerging]

- From central cloud to federation & brokering: Cloud-of-Cloud, System-of-System
- Edge Computing & automated functional distribution, devops
- IoT network re-configuration

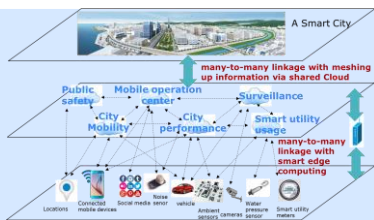
1-3 year



Hyperconnected IoT [Next Gen Discussion]

- Business mode: many-to-many data sharing
- semantic interoperability, multi-source data analysis, semantic context, sharing of control
- massive orchestration

2-5 year



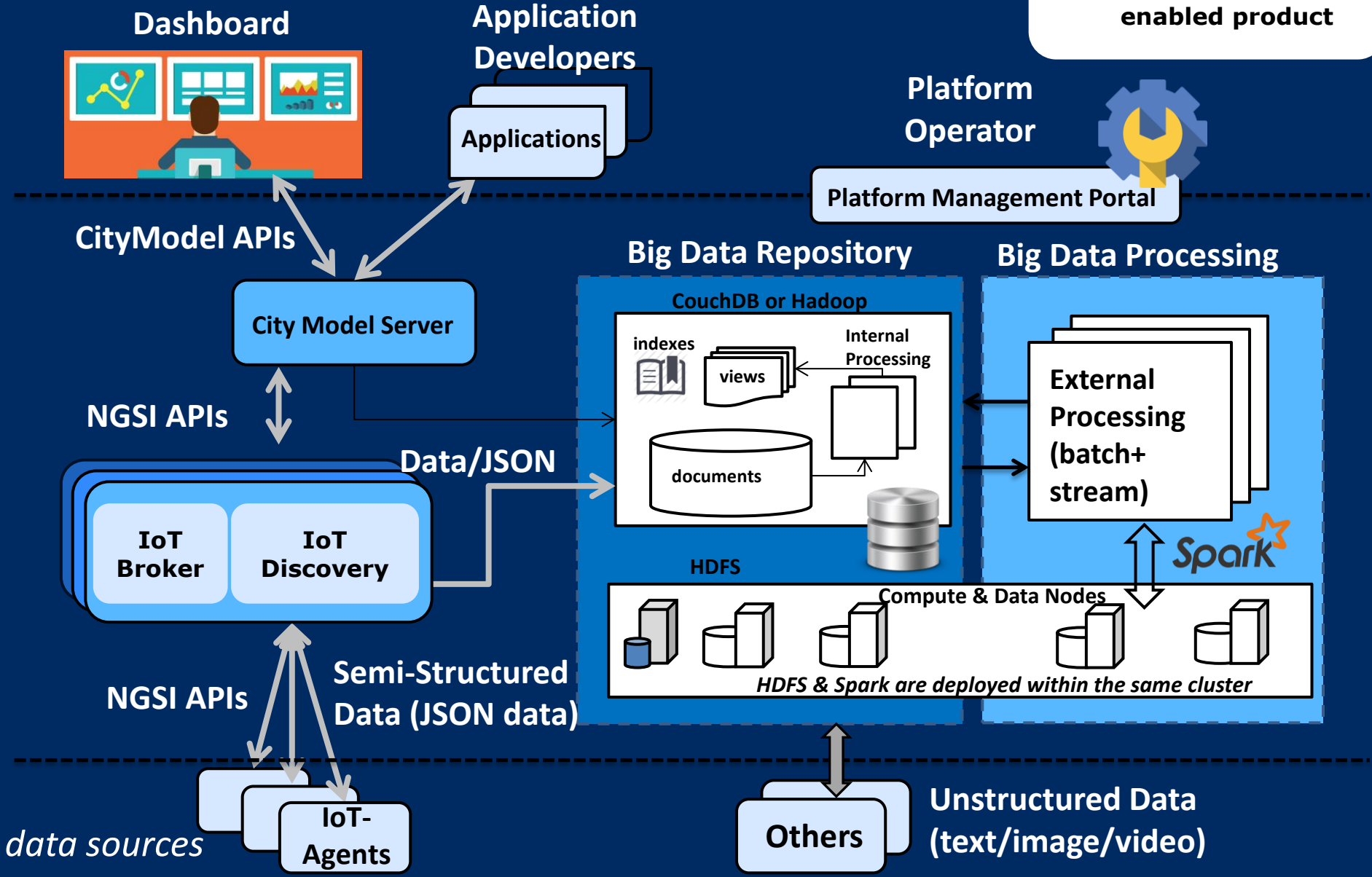
Extreme IoT [R&D starting]

- Massive use: „100-10K IoT objects **per room**“
- IoT & 5G: IoT into every (!) object
→ network impact , advance discovery & contextualized orchestration, tactile control

4-6 year



Cloud City Operation Center



FIWARE Activities: Outlook



EU-Korea Call

- **Wise-IoT**: Worldwide Interoperability for Semantic IoT
- making oneM2M, FIWARE, LoRa interoperable
- Creating business models for **GIoTS** (Global IoT Services)

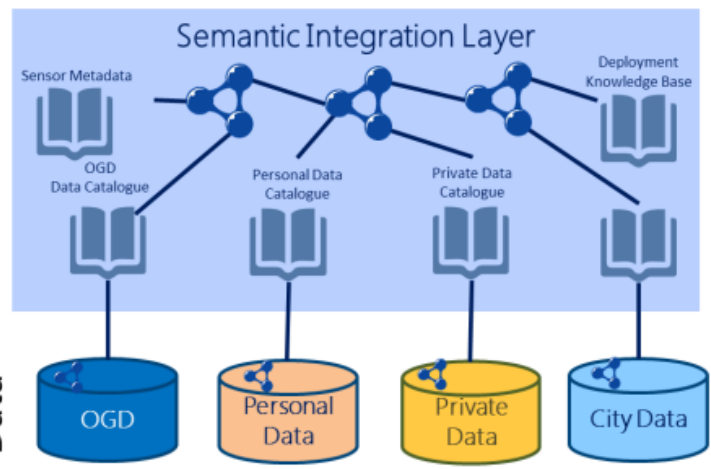


Edge Computing, Critical Situation

Santander Fench Alps Sevilla Busan FI Campus Olympics'18

EU-Japan Call

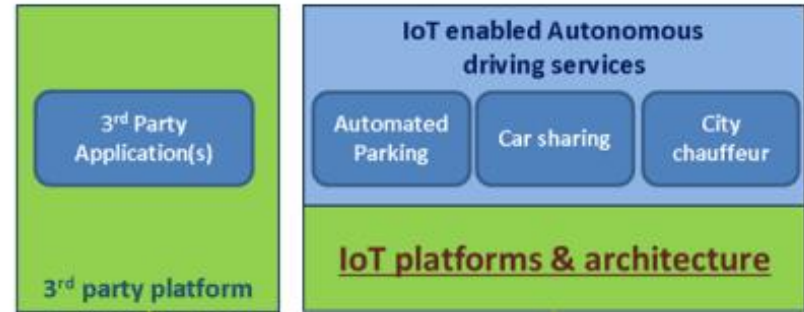
- CPaaS: City Platform as a Service
- Open Data & IoT Data & Private Data
- FIWARE as Basis, exploring Edge Computing



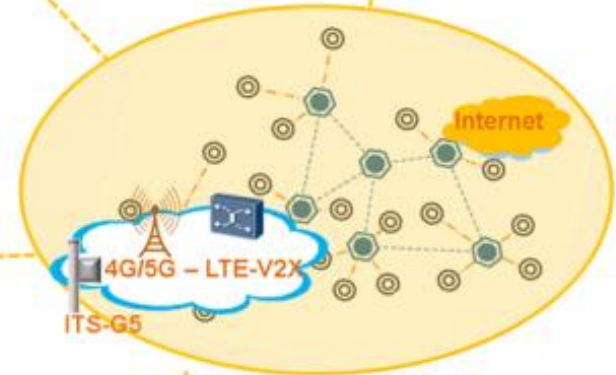
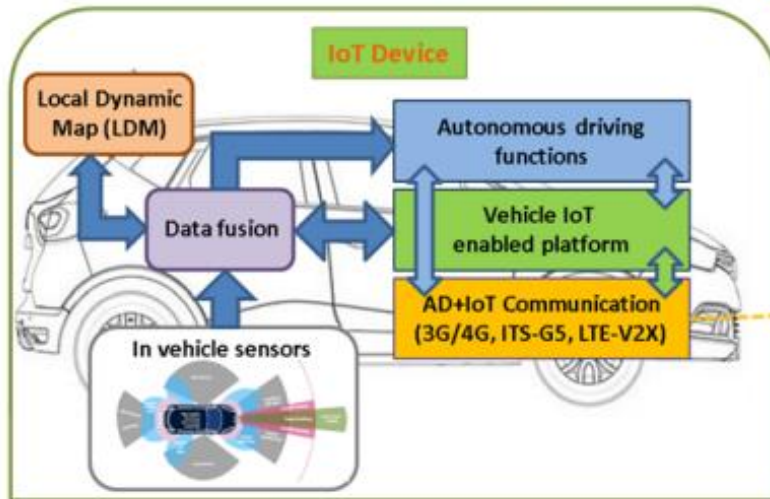
City Digitalisation, Event Manag.

Amsterdam Sapporo Tokyo Yokosuka

AUTOPILOT – Large Scale Pilot on „IoT for Autonomous Driving“

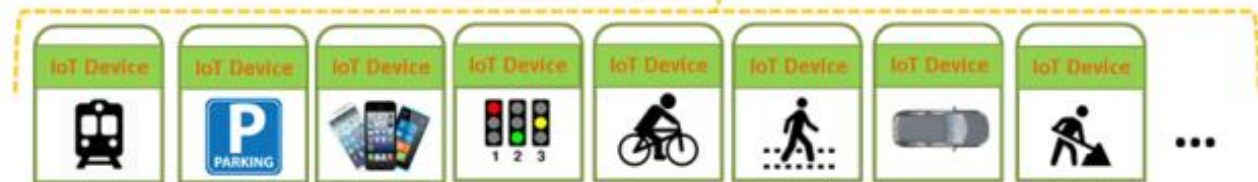


Vehicle IoT integration



Communication network

IoT eco-system



Brainport
Helmond/
Eindhoven

Tampere

Versailles

Florence-
Livorno

Vigo

Smart Shelf: Display Contextualized Advertisement



It's hot out there, Public Transport is full...



„I have plenty of more time to shop“



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