

SmartSantander: The meeting point between IoT and the citizens

Dubai Smart Cities Forum
Dubai, 7th June 2015

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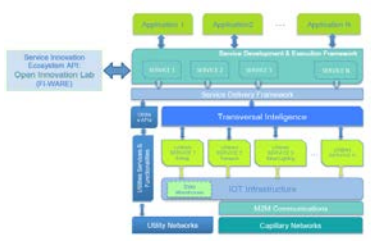
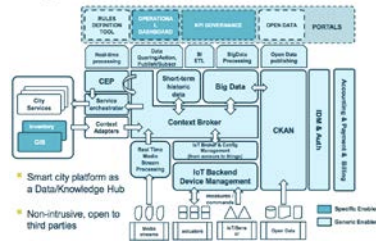
SmartSantander



City Scale Deployment



Holistic Management in Smart Cities



City Engagement & Co-Creation



IoT & Big Data Experimentation

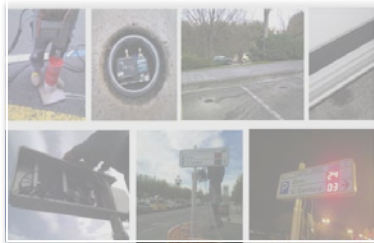


Building Smart Cities

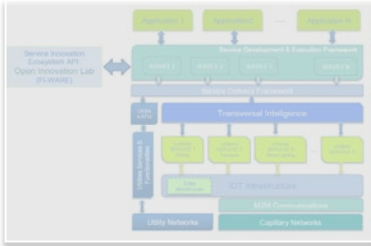
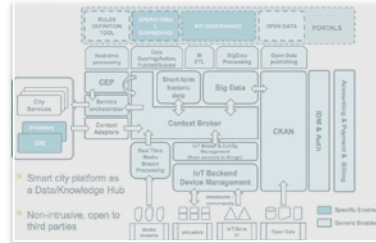


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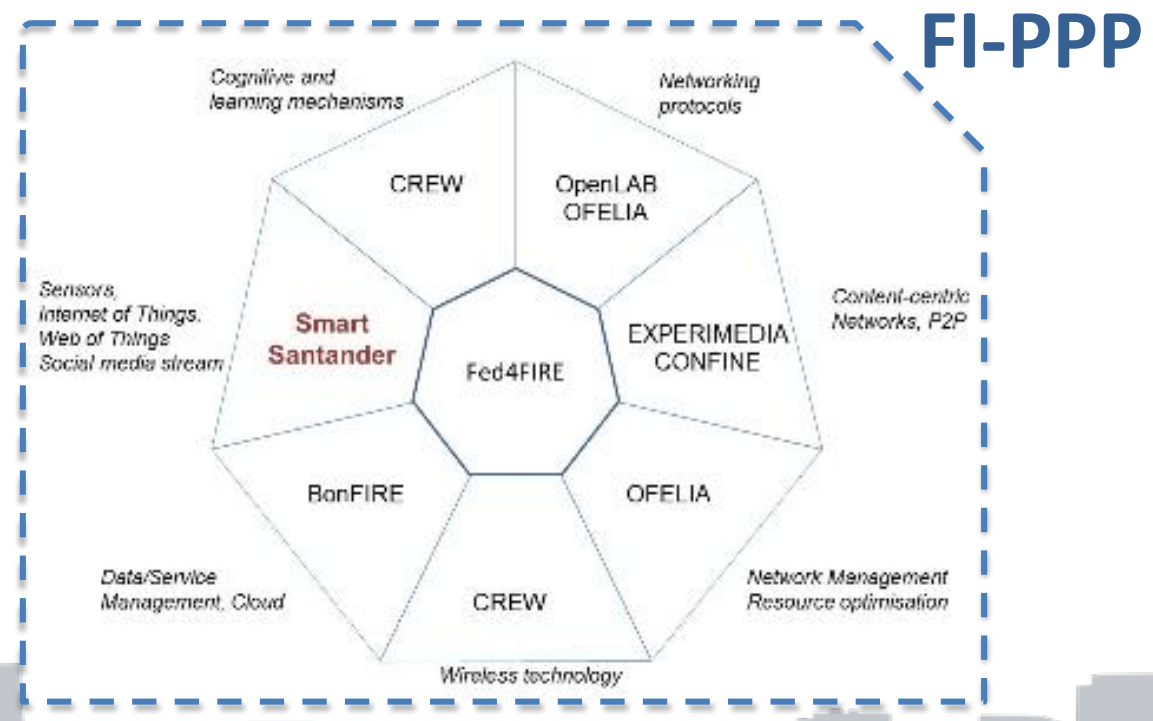


Smart City concept

- It is a complex ecosystem characterized by the intensive use of information and communications technologies (ICT) aiming at making the cities more **attractive**, more **sustainable** and a unique place for **innovation** and **entrepreneurship**.
- Hence, the city is becoming a unique place for **conceiving, designing, implementing and validating** relying on:
 - Citizens
 - Companies
 - Strategic alliances between public and private sector

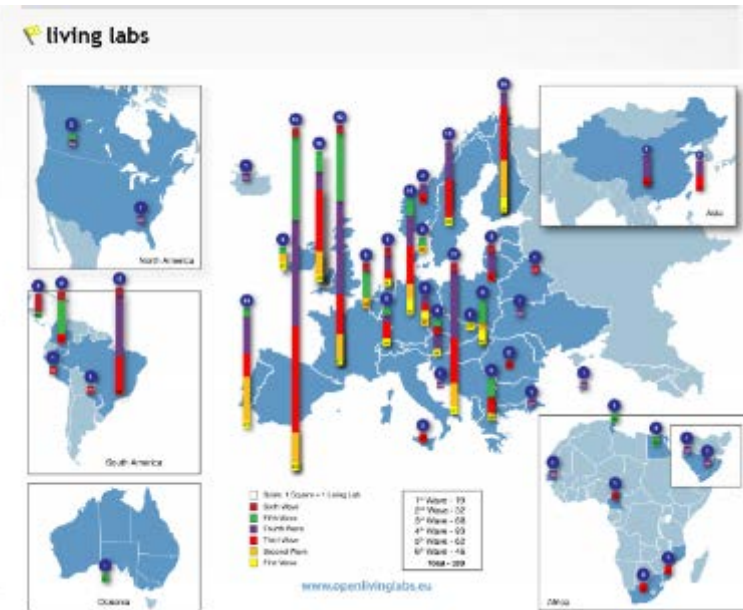
Building Smart Cities based on FIRE

- 🌀 **FIRE. Future Internet Research and Experimentation.**
 Enlarging the experimental facilities for supporting research and innovation in Future Internet



Open Innovation Ecosystems

- ENOLL, European Network of Living Labs
- OASC, Open and Agile Smart City initiative
-





Building Smart Cities

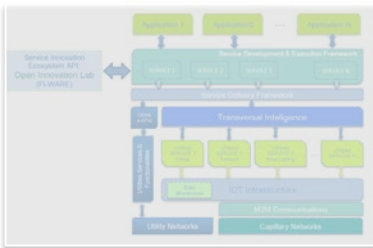
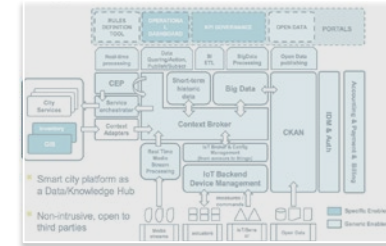


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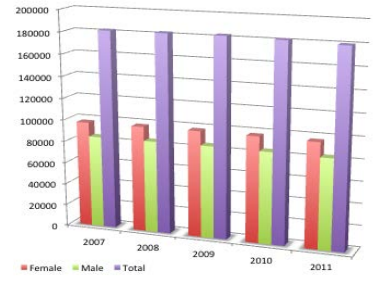
Santander at a glance

- Situated on the north coast of Spain, Santander is the capital of the Region of Cantabria.
- Santander has about 180,000 permanent inhabitants spread in around 33 Km².
- Lively economy based on the service sector. Municipality is focusing efforts to drive economy to new directions based on the innovation and knowledge.

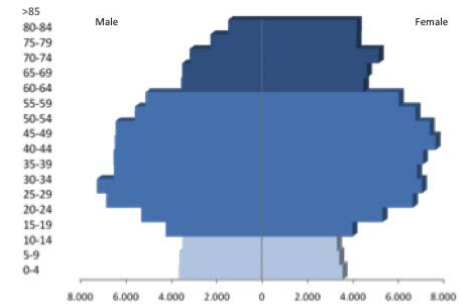
LOCATION



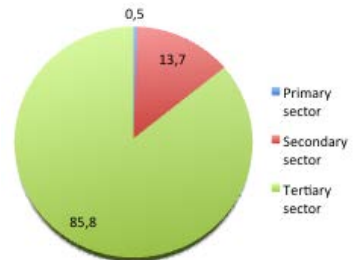
Demographic evolution



Population by age and sex

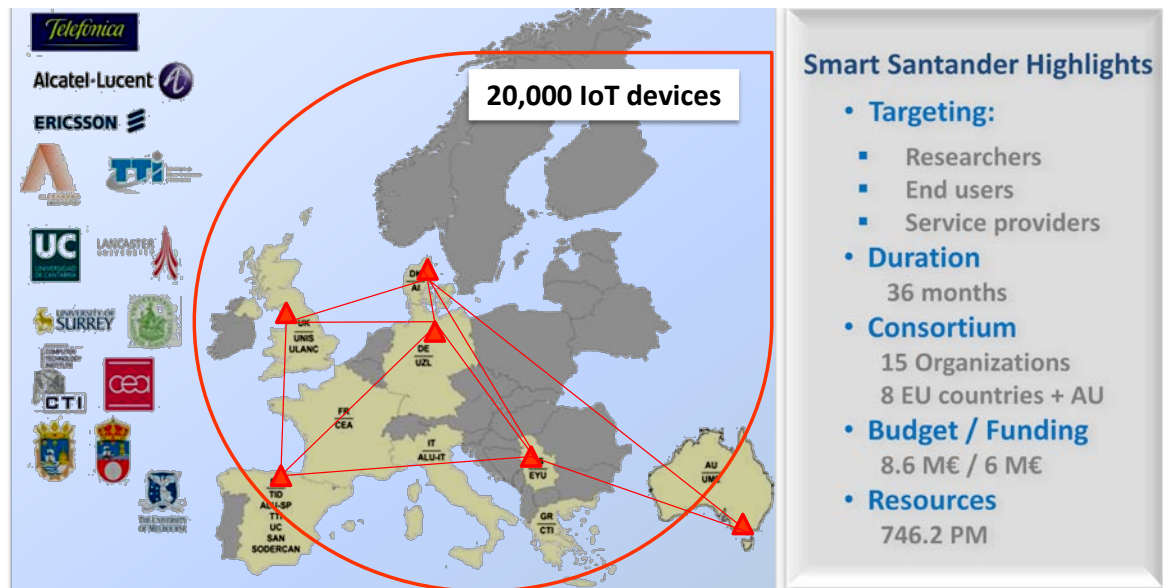


Employment distribution by economy sector



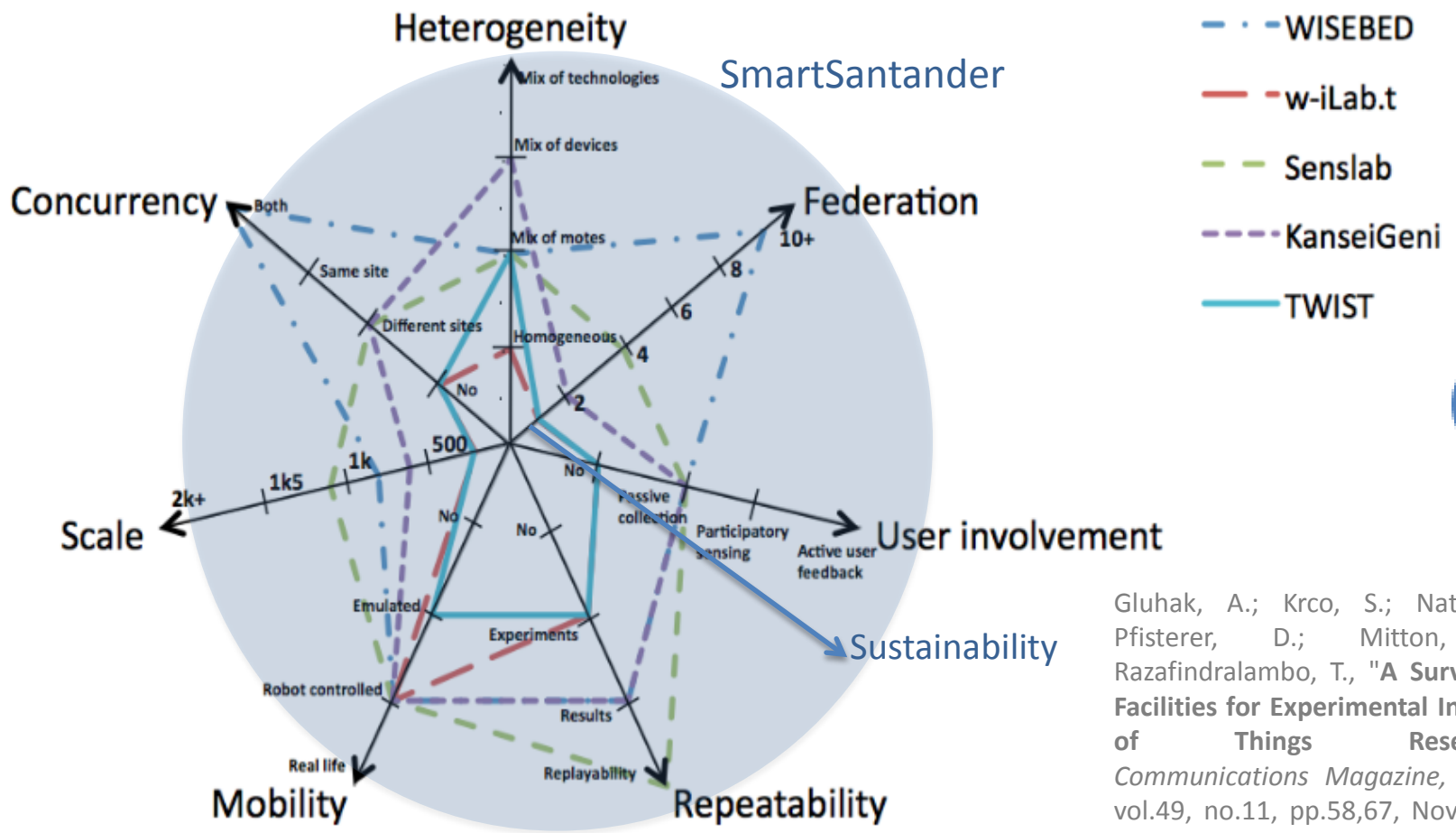
SmartSantander project

- City scale experimental facility for research and experimentation on architectures, key enabling technologies, services and applications for the Internet of Things





IoT facilities and metrics



Gluhak, A.; Krco, S.; Nati, M.; Pfisterer, D.; Mitton, N.; Razafindralambo, T., "A Survey on Facilities for Experimental Internet of Things Research," *Communications Magazine, IEEE*, vol.49, no.11, pp.58,67, November 2011



Approach

Build **open platform** for experimentation with IoT technologies and services in Smart cities, **not application demonstrator**



Provide a **set of initial services** for the benefit of city and citizens for basic platform **sustainability**



Foster an **innovation eco-system** and experiments with technology ideas, services and business models



Integrate successful IoT technologies and services for city/citizens and transfer to other markets



SmartSantander IoT deployment

Service Provision

- Mobility
- Environmental monitoring
- Park & gardens
- Participatory Sensing
- Augmented Reality
- Energy



Co-creating

- New urban services
- New applications
- ...relying on the citizen

Massive deployment of IoT devices

- Fixed nodes
- Mobile nodes
- Citizens as sensors
- Citizens Apps

<http://maps.smartsantander.eu/>



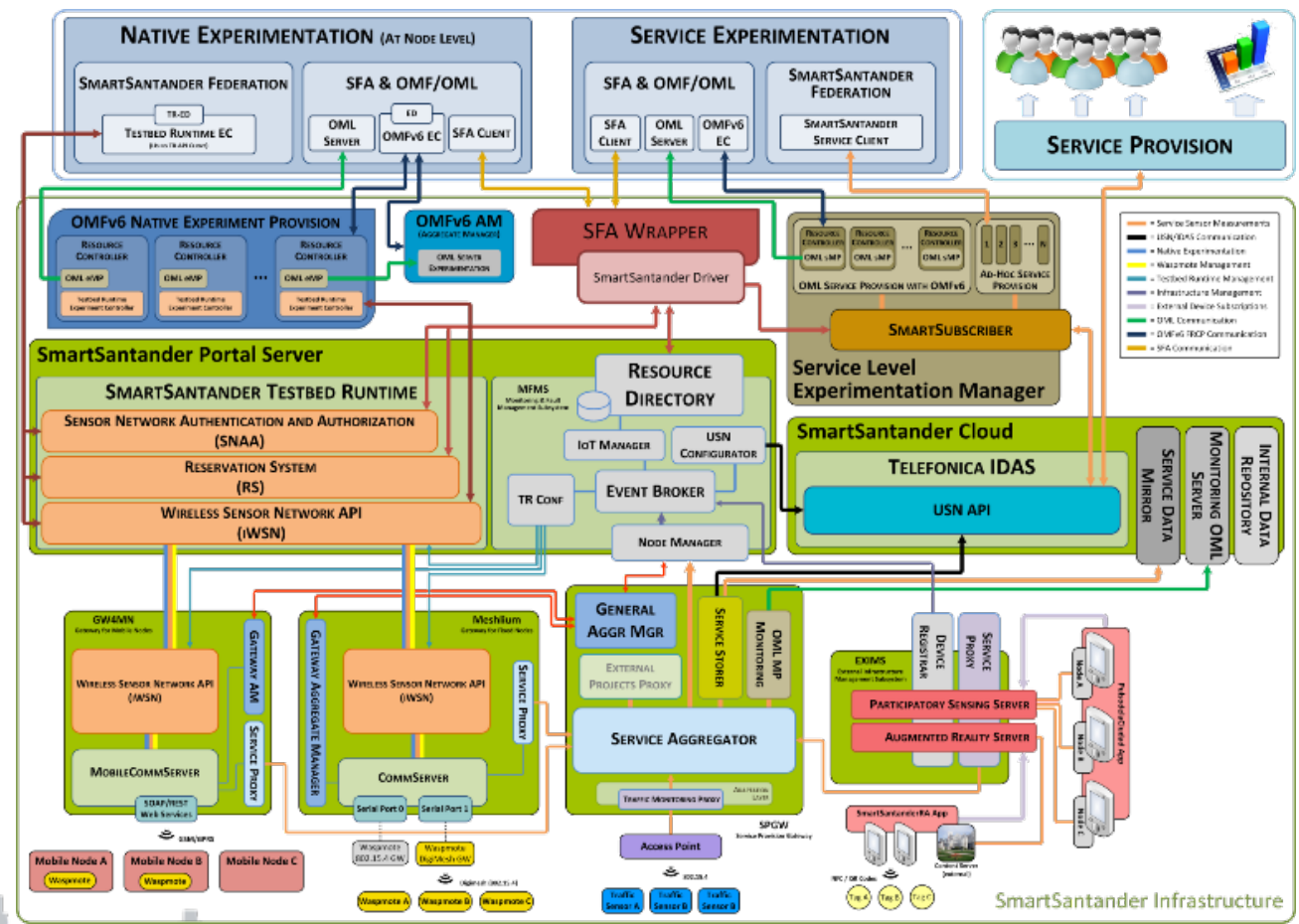
An IoT facility in the urban context

- A testbed beyond the traditional smart city concept
 - Duality
 - Deployment of an IoT facility for experimentation
 - Concurrent service provision
 - Catalyst of the ecosystem
 - Technology providers
 - Research centers
 - Urban service providers
 - Municipality and public sector
 - Finance sector





SmartSantander architecture



City-scale deployment

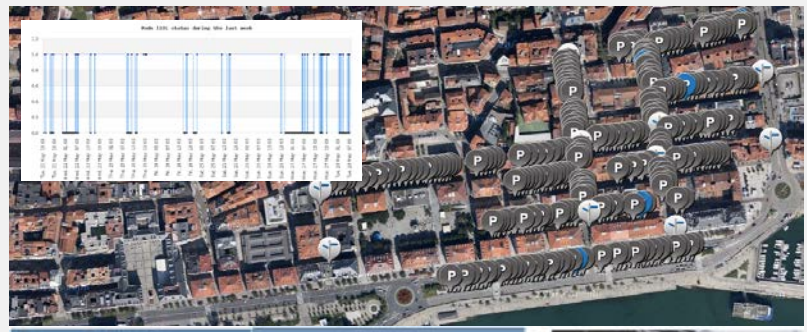


Street Parking Management

Sensors & Panels installation

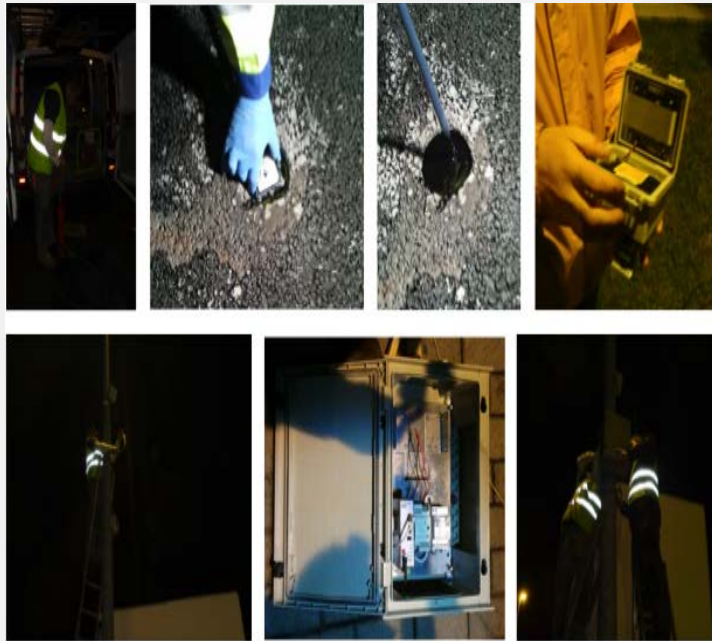


Service Provision & Monitoring



Traffic Management

Sensors installation



Service Provision & Monitoring







Actualizado el 2013-10-01T00:18:11+02:00

Calle ANTONIO MENDOZA, 1
 Corte Total
 Del día 1/8/2013 al día 31/12/2013
 En horario de 8:00 hasta las 20:00

VALDECILLA ROTONDA



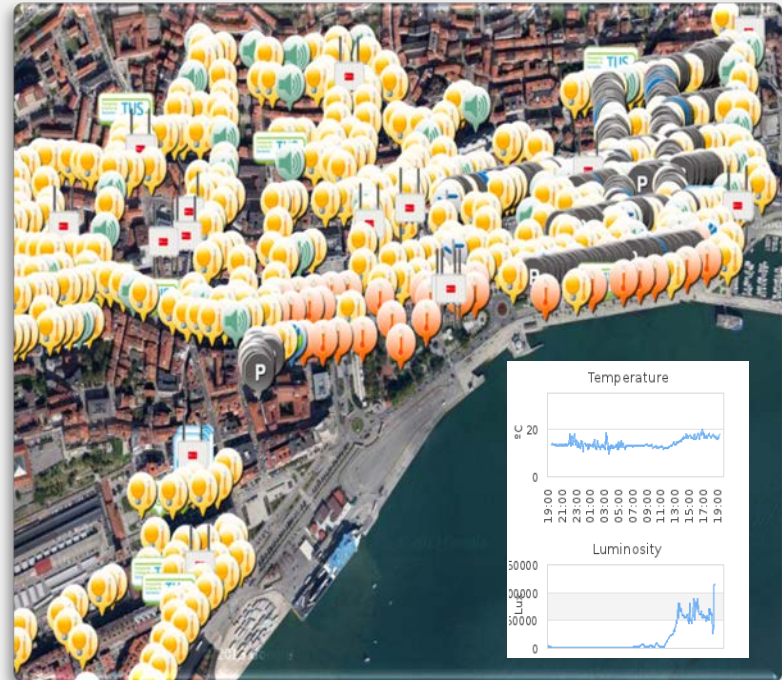
TRAFFIC STATUS	
	Fluid
	Moderate
	Dense
	Congestion

Environmental Monitoring

Sensors installation



Service Provision & Monitoring

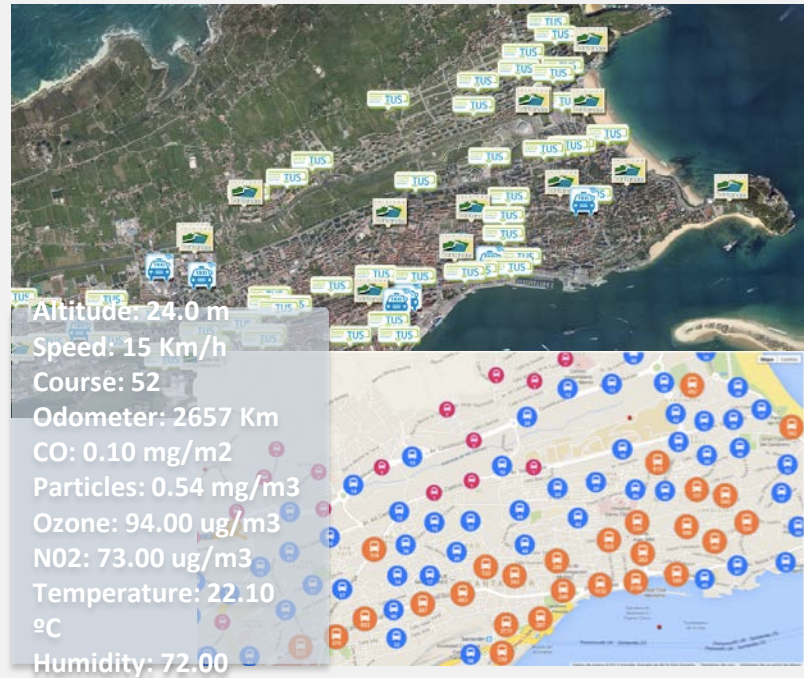


Mobile Environmental Monitoring

Sensors installation

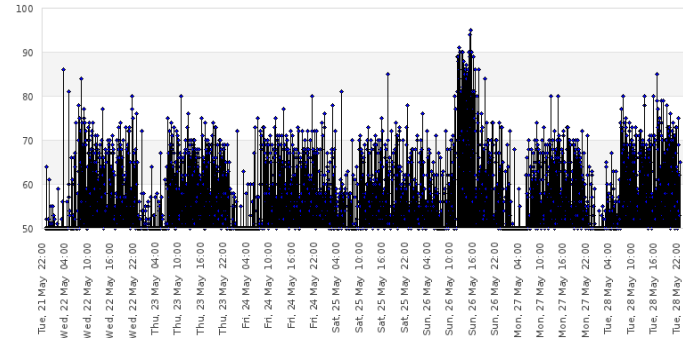


Service Provision & Monitoring

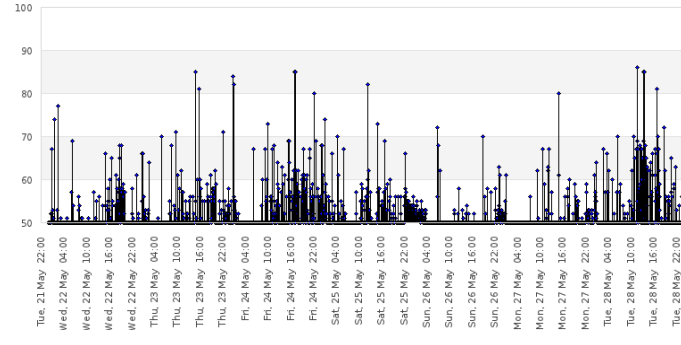


Noise Monitoring

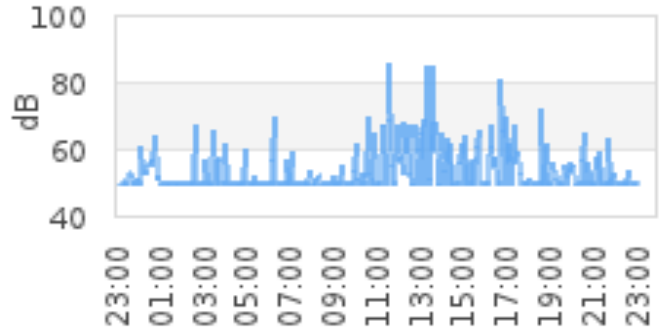
Node 380: status during the last week



Node 237: status during the last week



Noise

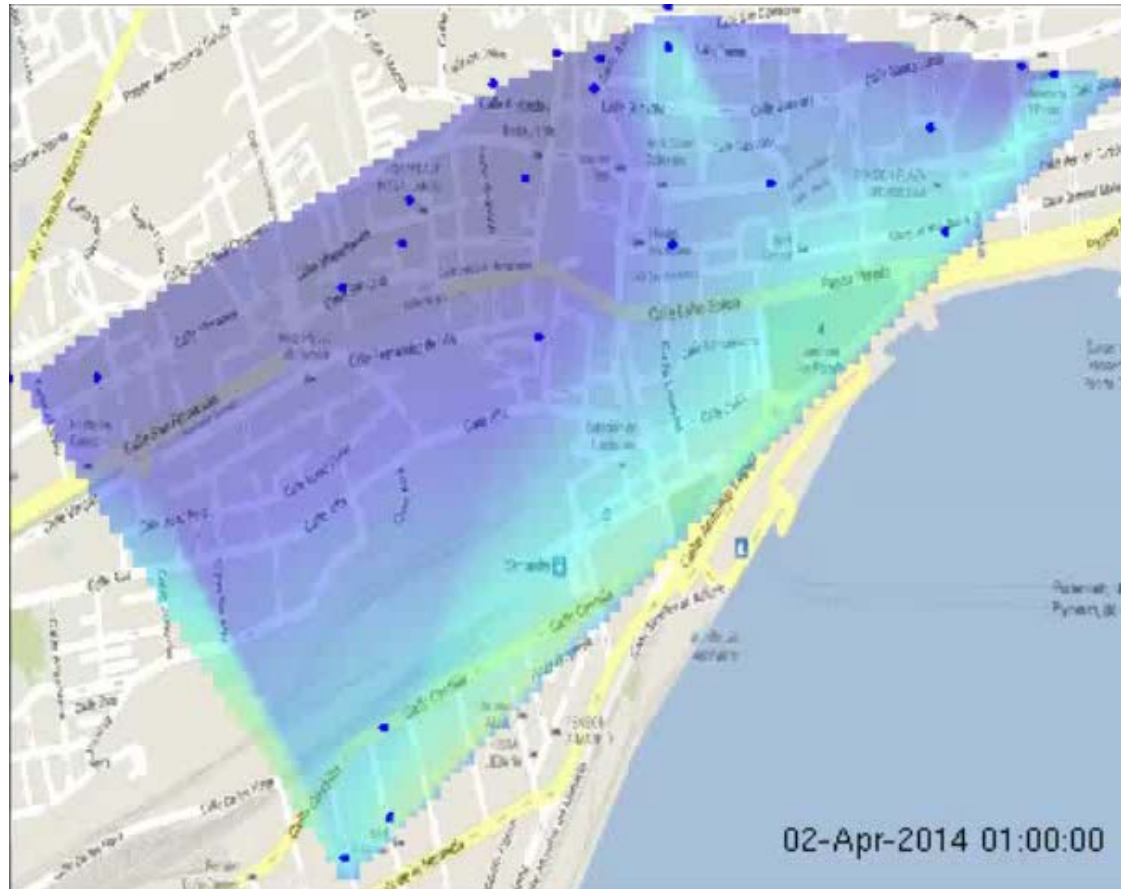


Noise Monitoring





Noise Monitoring

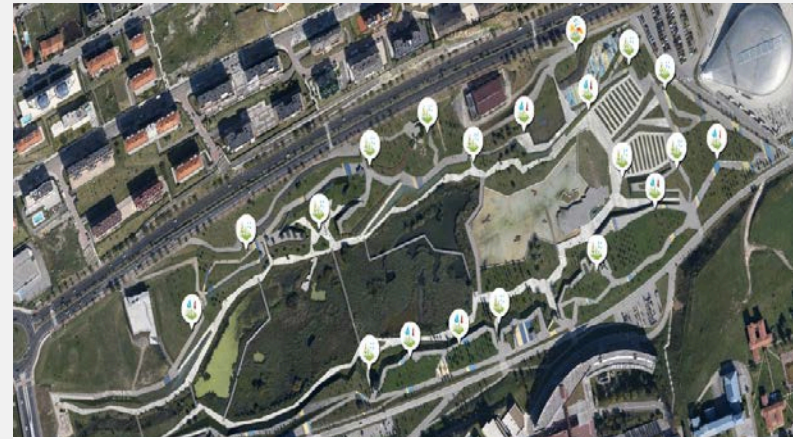


Parks and Gardens Irrigation

Sensors installation



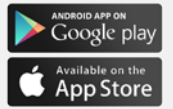
Service Monitoring



Type	Date	NodeId	Position	Temperature	Relative Humidity	Soil Moisture	Ground Temperature
agriculture	2013-10-01 18:50:22	3242	-3.76588 43.46890	24.03 °C	70.76 %		
irrigation	2013-10-01 18:50:22	3214	-3.80351 43.47404	25.13 °C	68.76 %	37.238919297569 centibares	23.22 °C

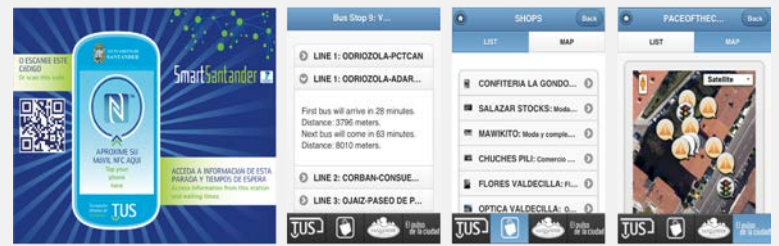
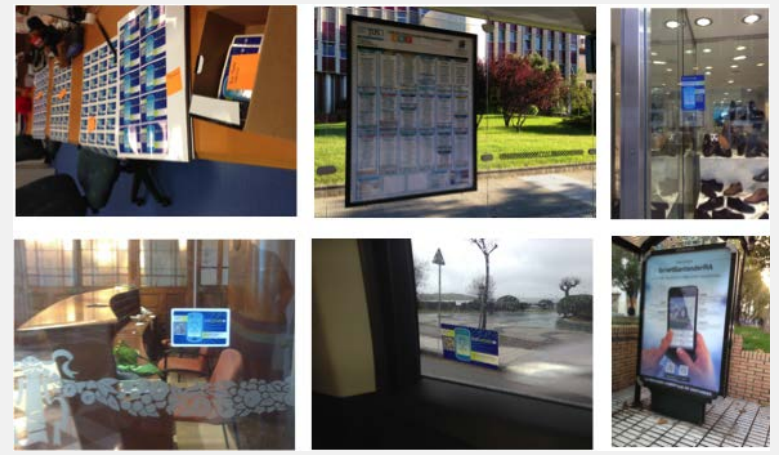
Augmented Reality

SmartSantanderRA application



3000 POIs
More than 22000 downloads,

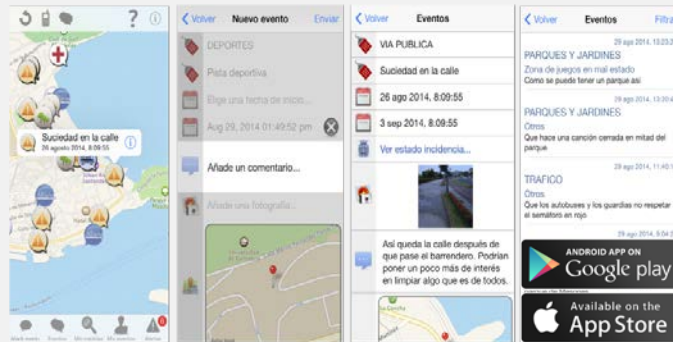
QR Codes & NFC tags deployment





Participatory Sensing

Paceofthecity application



Elpulsodelaciudad.com



EL DIARIO
MONTAÑÉS
MULTIMEDIA

IoT and Urban Services



Smart Parking



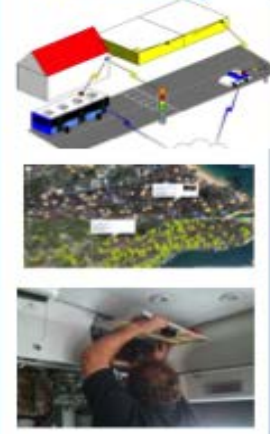
Street Lighting



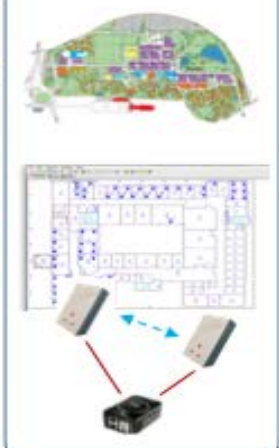
Parks and Gardens



Environmental Monitoring

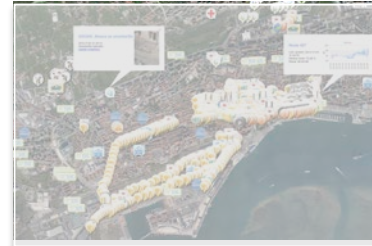


Smart Buildings





Building Smart Cities

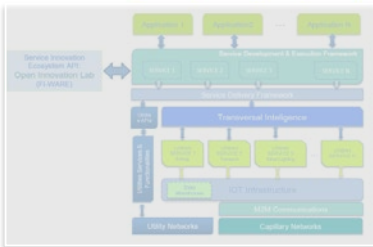
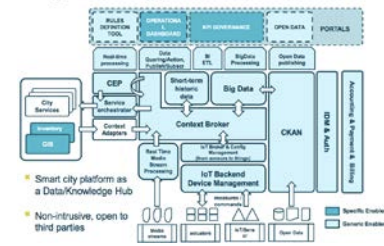


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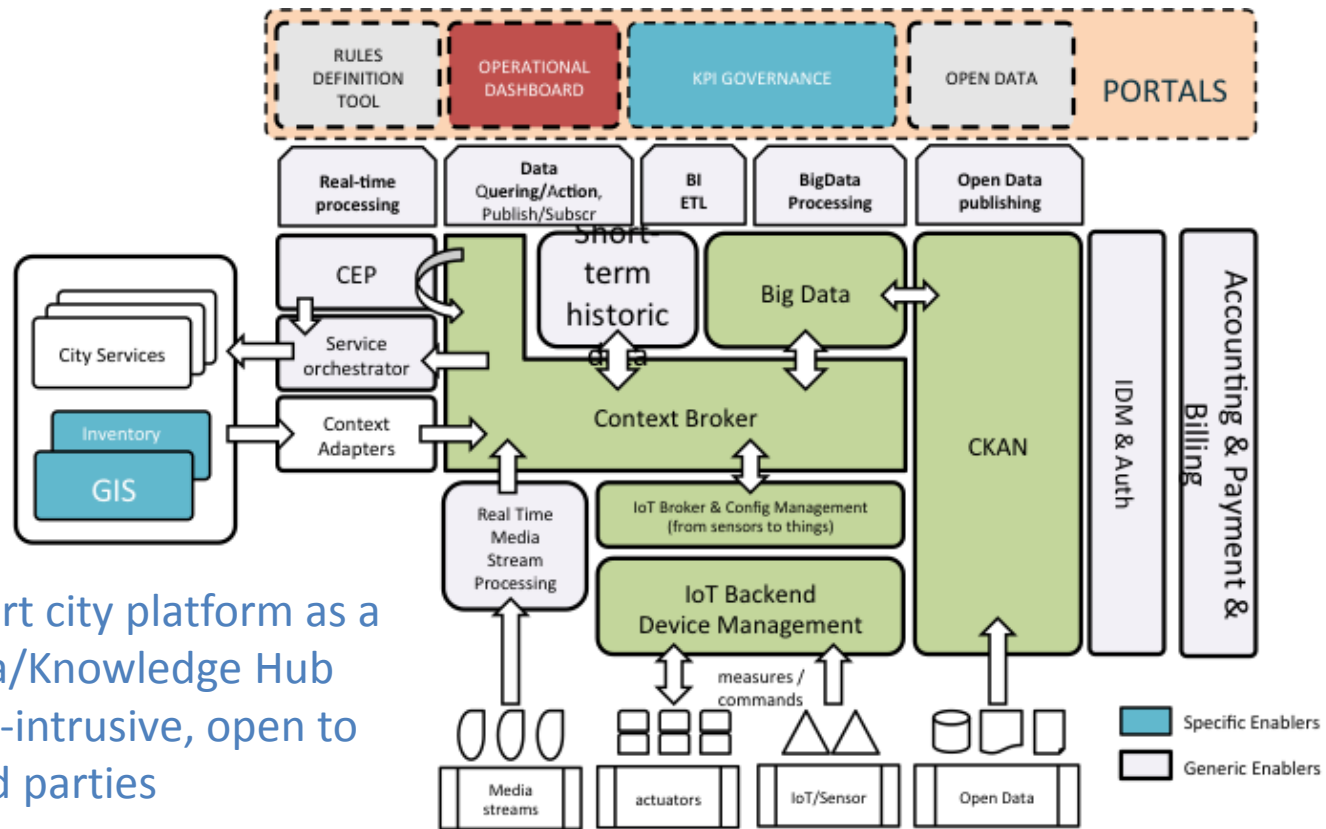


Holistic management of the Smart City

- After running the project during four years, a plethora of IoT devices, applications and services were available.
 - Massive amount of data generated
- In the short/medium term, more urban services to be integrated.
 - The citizens have to be engaged
- The smart city paradigm playing a relevant role in attracting and mobilizing stakeholders (innovation).
- The solution has to rely on an open platform able to integrate new and legacy infrastructures.



FIWARE Smart City platform



- Smart city platform as a Data/Knowledge Hub
- Non-intrusive, open to third parties



FIWARE LAB: A working instance of FIWARE working as “the meeting point” where innovation takes place

App Customers and Data providers

- Connect to entrepreneurs
- Put their data at work
- Bring new innovative services to end users
- Be more efficient
- Social Reputation

Entrepreneurs, Developers

- Develop once for a large market
- Easily meet potential customers
- Marketing, promotion
- Ability to test with real data and end users
- Simple yet powerful APIs that accelerate product development



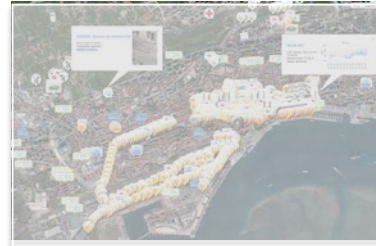
FIWARE Technology Providers

- “Coopetitive” approach
- Connect to entrepreneurs: jointly exploit the opportunities





Building Smart Cities

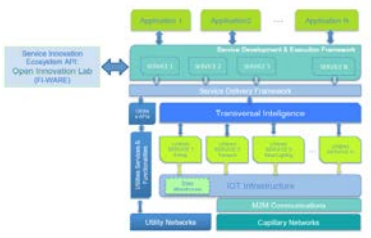


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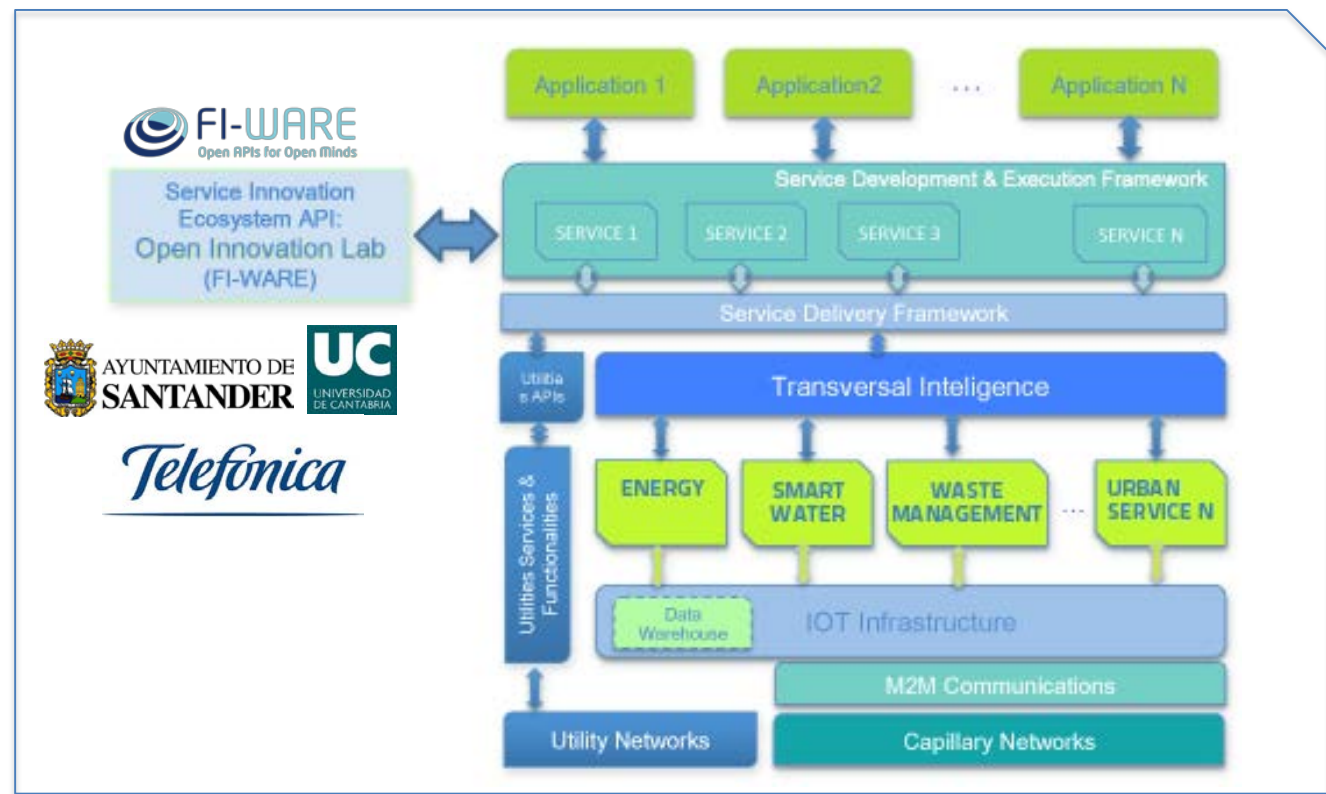
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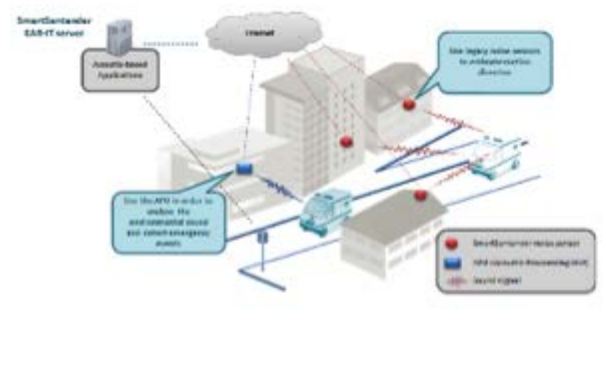
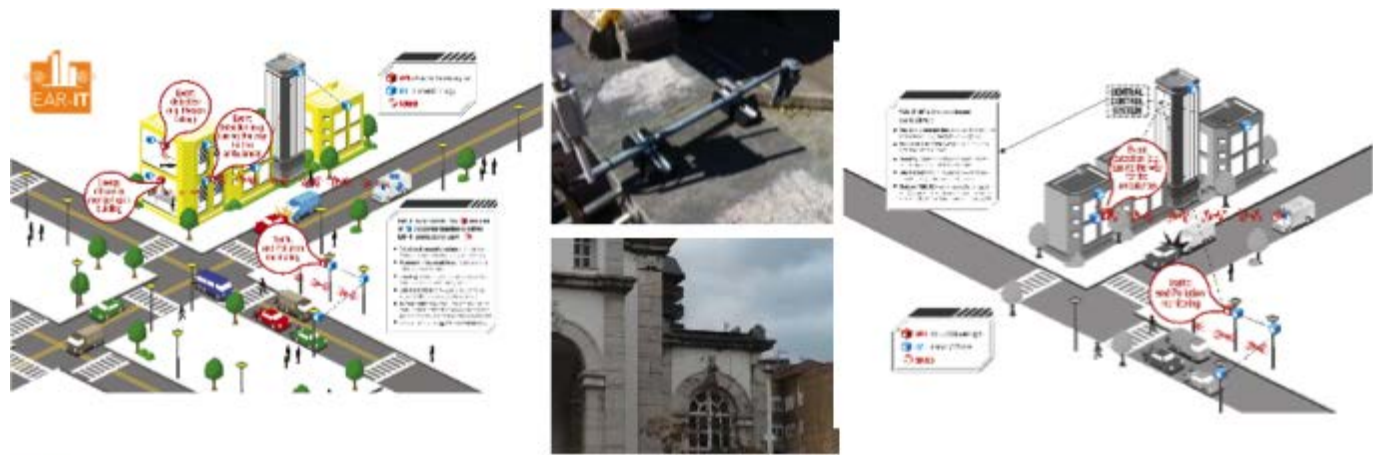
IoT & Big Data Experimentation



Santander approach



Capitalizing the sounds of the city

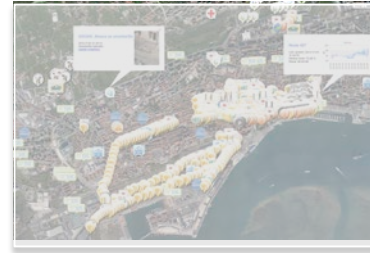


EAR-IT Traffic Monitoring in SmartSantander



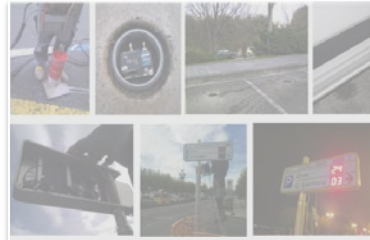


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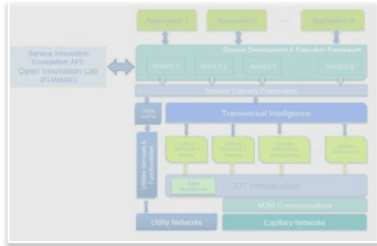
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Smart Cities, IoT and big data: The path towards sustainable cities

- Big data will be one of the pillars for building **autonomic cities**.
- Big data alone is not enough. The engine which is able to learn and create knowledge is needed: The **city brain**
- The city brain requires a **holistic view**: Transversal cooperation among services versus the traditional silos perspective.
- The city of the future has to operate in a **predictive (proactive)** mode instead of reactive one.
- Big data might become one tool for enabling smart cities to **organically** grow. Hence, stimulating citizens to participate more actively in the design of the forthcoming services and technologies to be adopted by the cities.

Sustainability

