



ExpoSolar[®]
Colombia

¡Trabajamos con la mejor energía!

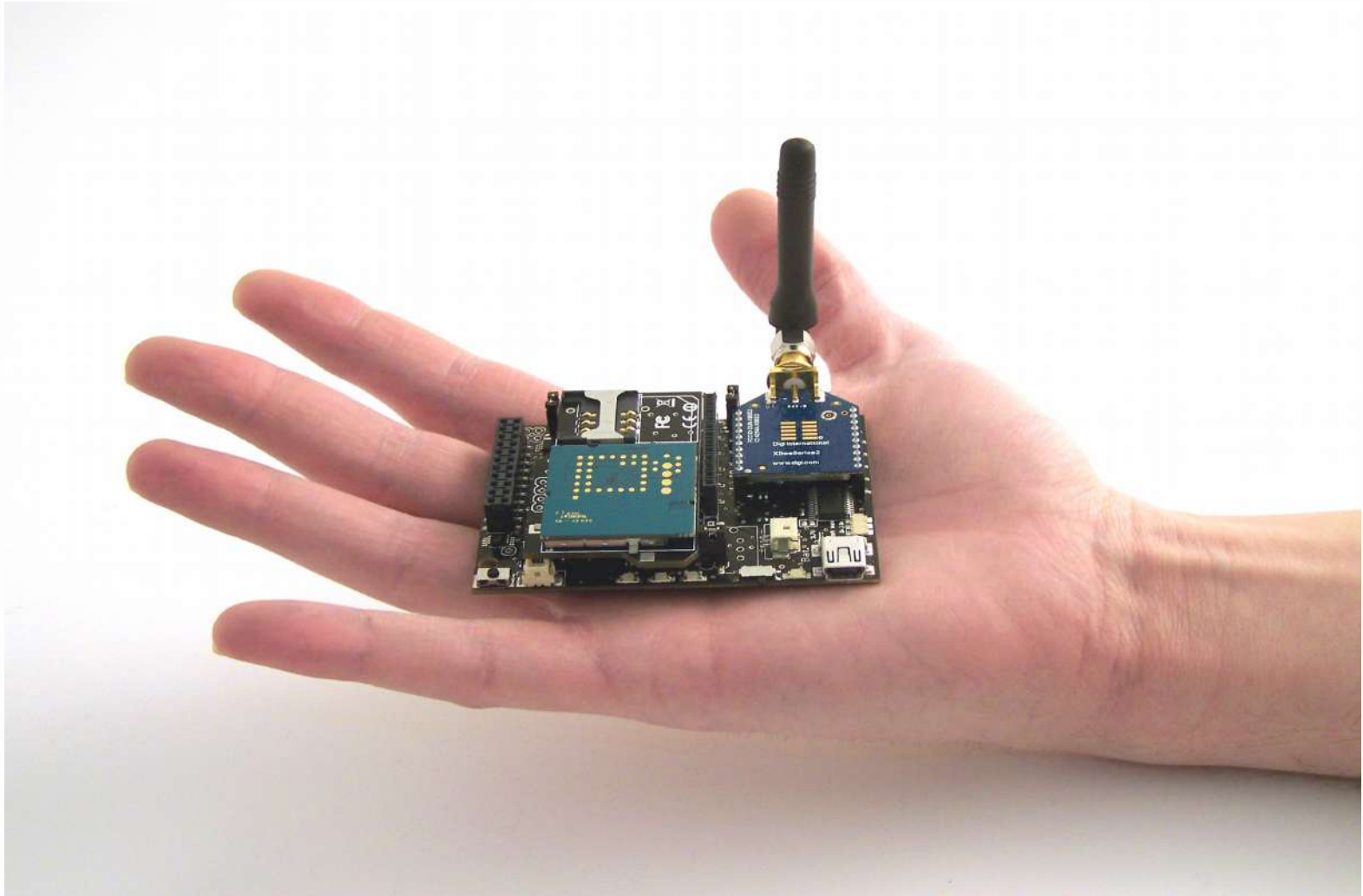


David Gascón - CTO

d.gascon@libelium.com

@DG_David_Gascon

<http://facebook.com/david.gascon.dg>



Libelium Smart World

Air Pollution

Control of CO₂ emissions of factories, pollution emitted by cars and toxic gases generated in farms.

Forest Fire Detection

Monitoring of combustion gases and preemptive fire conditions to define alert zones.

Wine Quality Enhancing

Monitoring soil moisture and trunk diameter in vineyards to control the amount of sugar in grapes and grapevine health.

Offspring Care

Control of growing conditions of the offspring in animal farms to ensure its survival and health.

Sportsmen Care

Vital signs monitoring in high performance centers and fields.

Structural Health

Monitoring of vibrations and material conditions in buildings, bridges and historical monuments.

Quality of Shipment Conditions

Monitoring of vibrations, strokes, container openings or cold chain maintenance for insurance purposes.

Smartphones Detection

Detect iPhone and Android devices and in general any device which works with Wifi or Bluetooth interfaces.

Perimeter Access Control

Access control to restricted areas and detection of people in non-authorized areas.

Radiation Levels

Distributed measurement of radiation levels in nuclear power stations surroundings to generate leakage alerts.

Electromagnetic Levels

Measurement of the energy radiated by cell stations and WiFi routers.

Traffic Congestion

Monitoring of vehicles and pedestrian affluence to optimize driving and walking routes.

Smart Roads

Warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.

Smart Lighting

Intelligent and weather adaptive lighting in street lights.

Intelligent Shopping

Getting advices in the point of sale according to customer habits, preferences, presence of allergic components for them or expiring dates.

Noise Urban Maps

Sound monitoring in bar areas and centric zones in real time.

Water Leakages

Detection of liquid presence outside tanks and pressure variations along pipes.

Vehicle Auto-diagnosis

Information collection from CanBus to send real time alarms to emergencies or provide advice to drivers.

Item Location

Search of individual items in big surfaces like warehouses or harbours.

Waste Management

Detection of rubbish levels in containers to optimize the trash collection routes.

Smart Parking

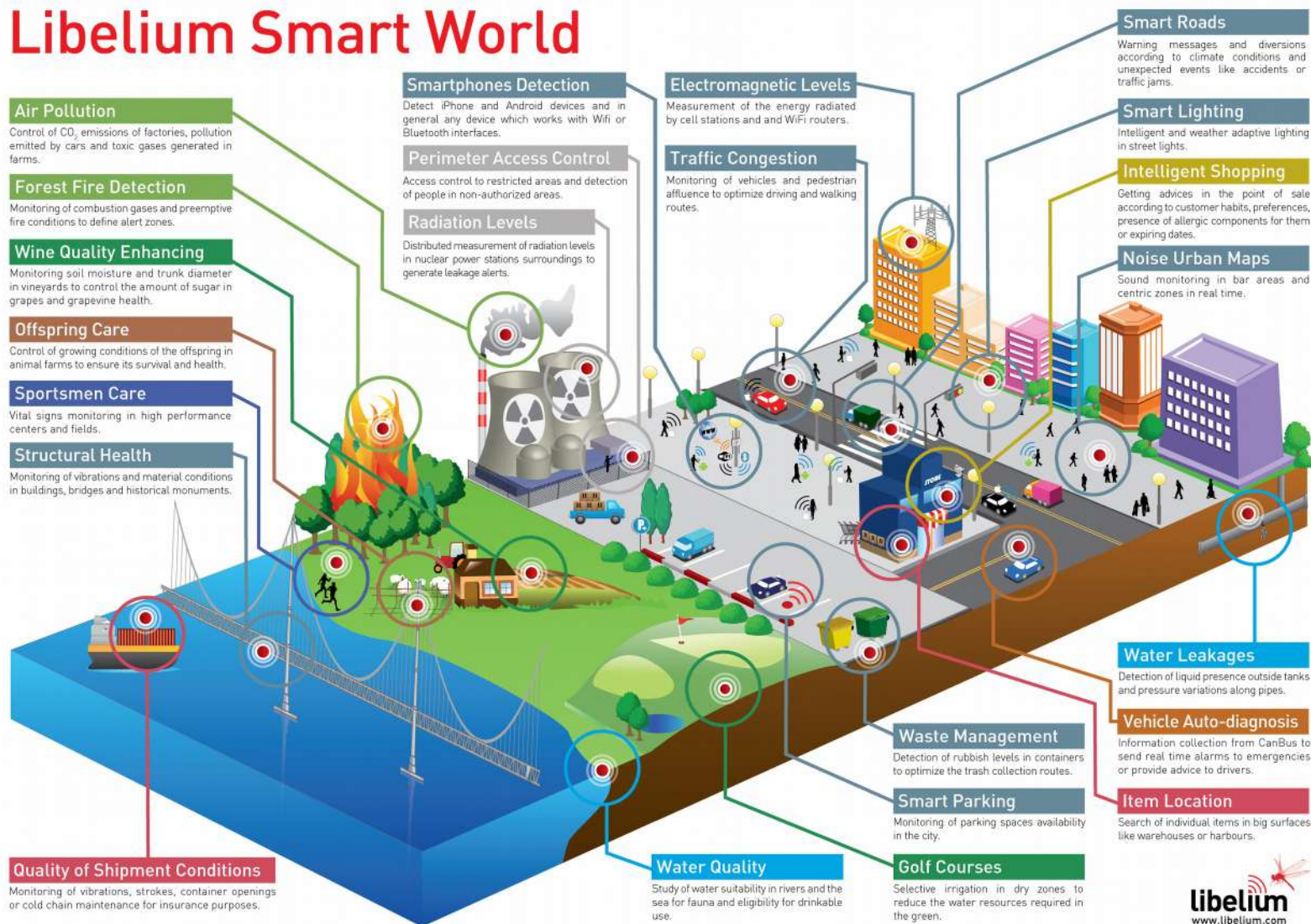
Monitoring of parking spaces availability in the city.

Golf Courses

Selective irrigation in dry zones to reduce the water resources required in the green.

Water Quality

Study of water suitability in rivers and the sea for fauna and eligibility for drinkable use.

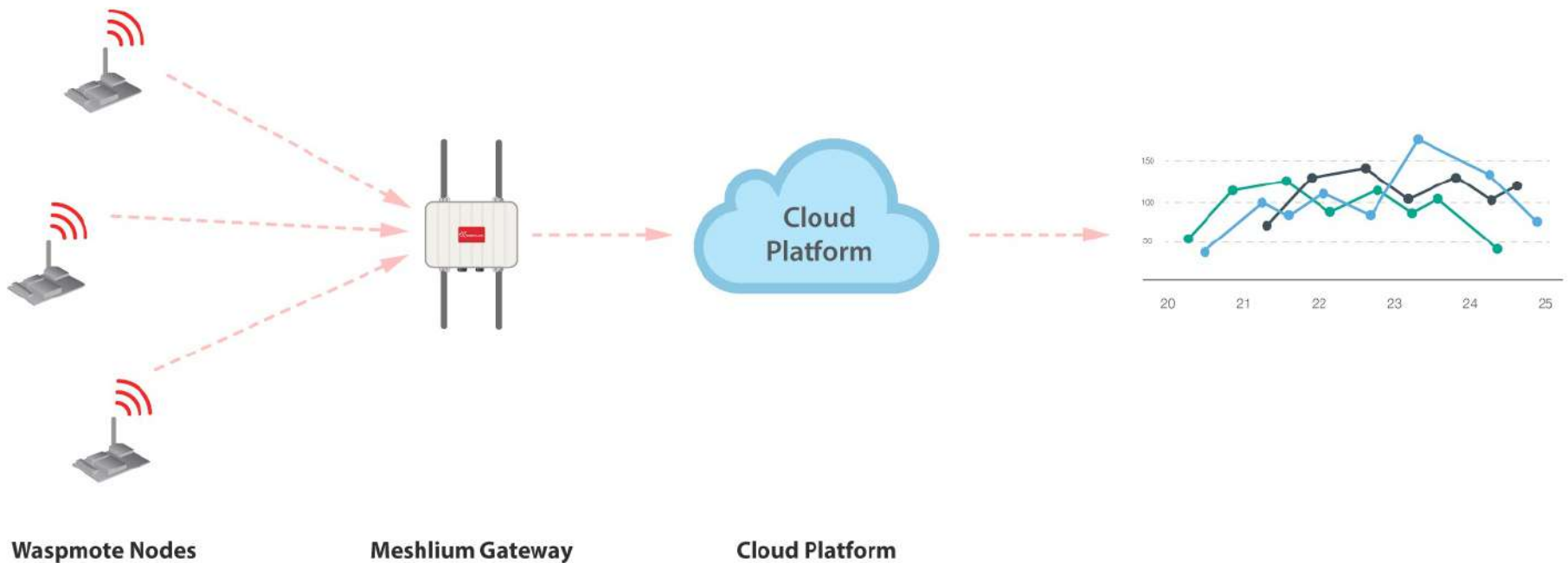


Plug & Sense! Sensor Node



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Internet of Things Layers



Pollution Sensors

Particles, Air Contaminants



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New Calibrated Gas Sensor



Pollution Sensors

Particles, Air Contaminants



Smart Environment PRO

Smart Environment PRO enables the Air Quality Index (AQI) calculation, thanks to 16 gas sensors providing extremely accurate ppm values and a high-end Particle Matter sensor.

Sensors:

- ▶ Carbon Monoxide (CO) [Calibrated] (low and high concentrations)
- ▶ Carbon Dioxide (CO₂) [Calibrated]
- ▶ Molecular Oxygen (O₂) [Calibrated]
- ▶ Ozone (O₃) [Calibrated]
- ▶ Nitric Oxide (NO) [Calibrated] (low concentrations)
- ▶ Nitric Dioxide (NO₂) [Calibrated]
- ▶ Sulfur Dioxide (SO₂) [Calibrated] (high accuracy)
- ▶ Ammonia (NH₃) [Calibrated] (low and high concentrations)
- ▶ Methane (CH₄) [Calibrated] – and other combustible gases
- ▶ Molecular Hydrogen (H₂) [Calibrated]
- ▶ Hydrogen Sulfide (H₂S) [Calibrated]
- ▶ Hydrogen Chloride (HCl) [Calibrated]
- ▶ Hydrogen Cyanide (HCN) [Calibrated]
- ▶ Phosphine (PH₃) [Calibrated]
- ▶ Ethylene Oxide (ETO) [Calibrated]
- ▶ Chlorine (Cl₂) [Calibrated]
- ▶ Particle Matter (PM1 / PM2.5 / PM10) - Dust Sensor
- ▶ Temperature
- ▶ Humidity
- ▶ Atmospheric pressure
- ▶ Luminosity (Luxes Accuracy) for Smart Lighting
- ▶ Ultrasound (distance measurement)

Pollution Sensors

Particles, Air Contaminants

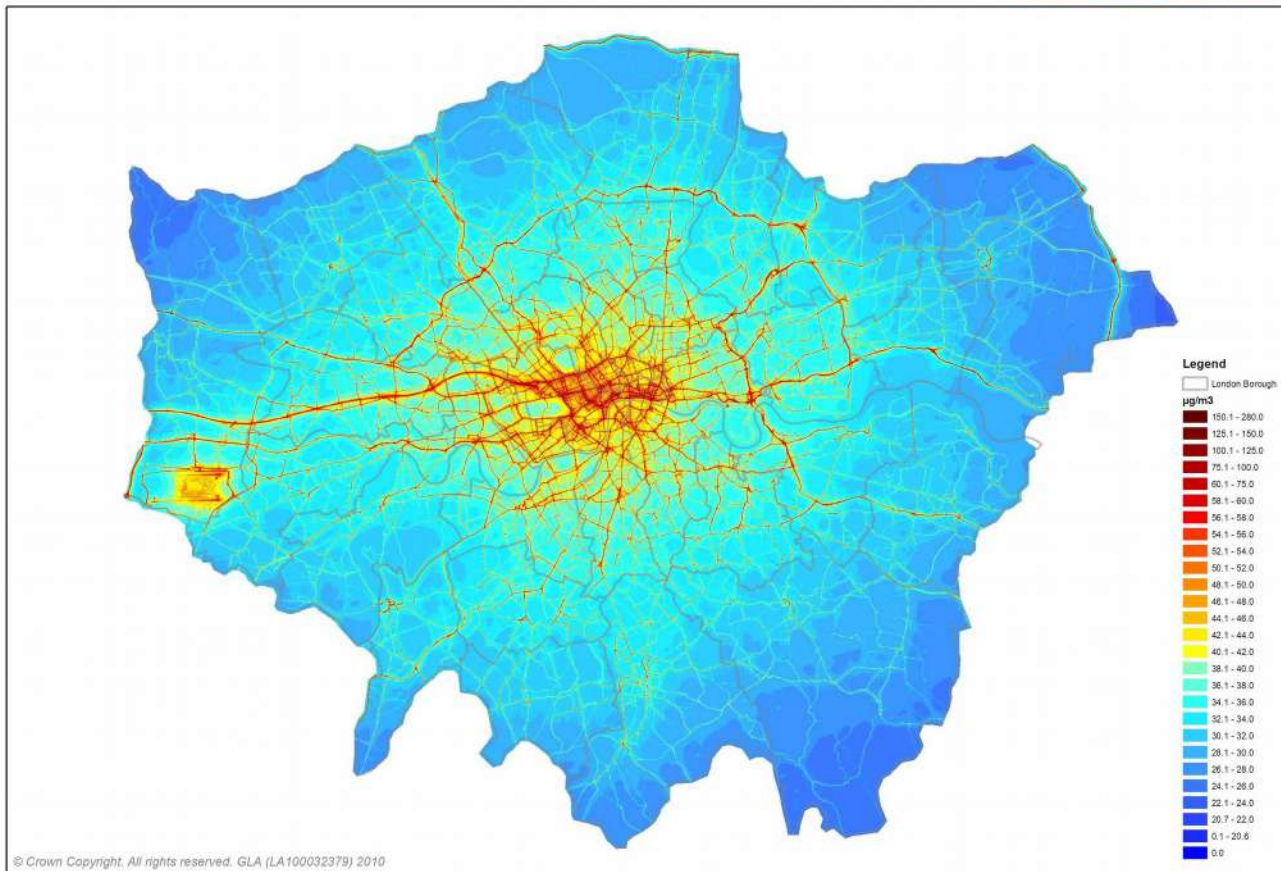


Pollution Sensors

Particles, Air Contaminants

LAEI 2008: NO₂ Annual Mean - 2008

GREATERLONDONAUTHORITY



Air Quality Project

Mallorca's Harbor



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Air Quality Project

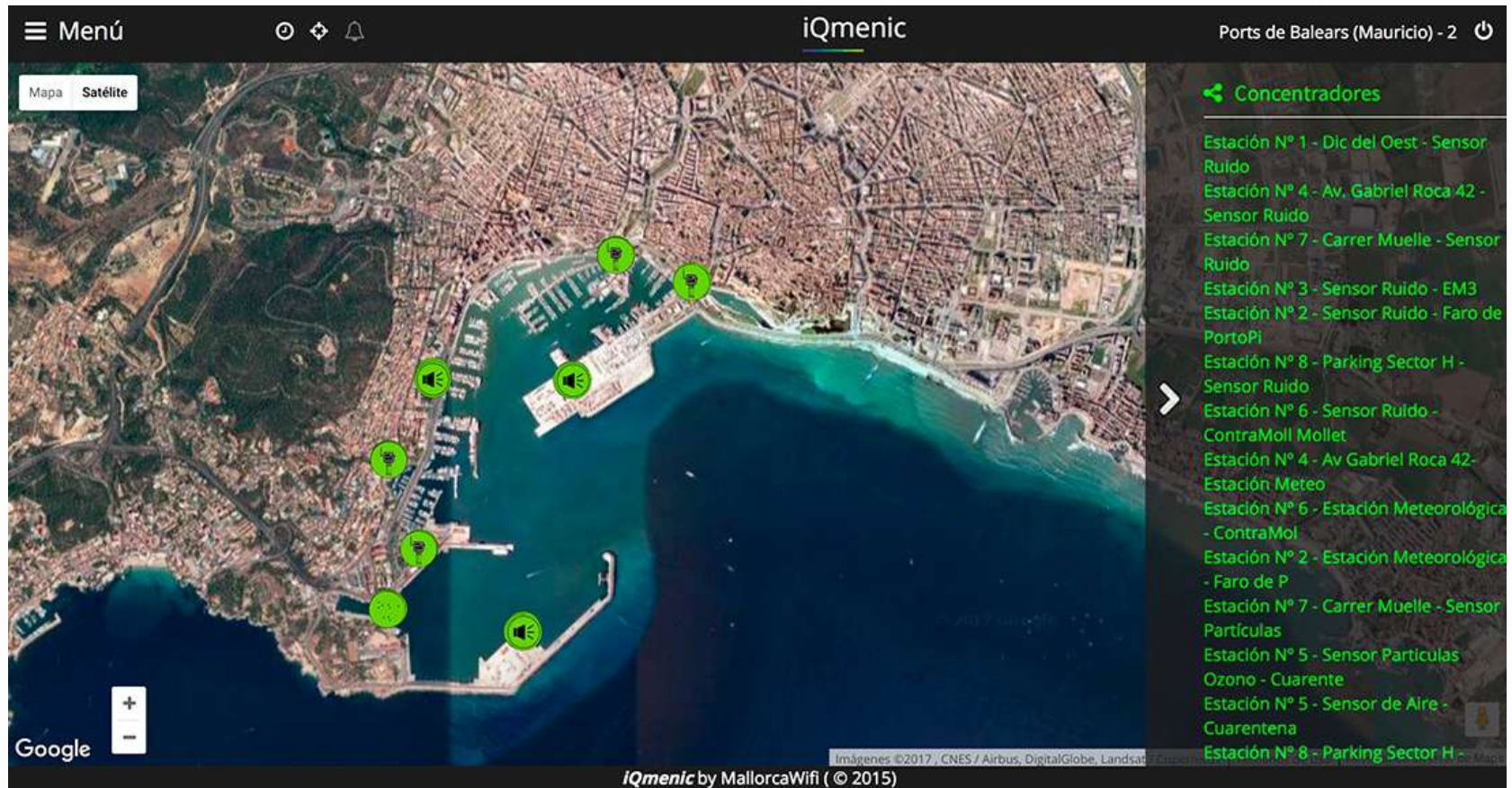
Mallorca's Harbor



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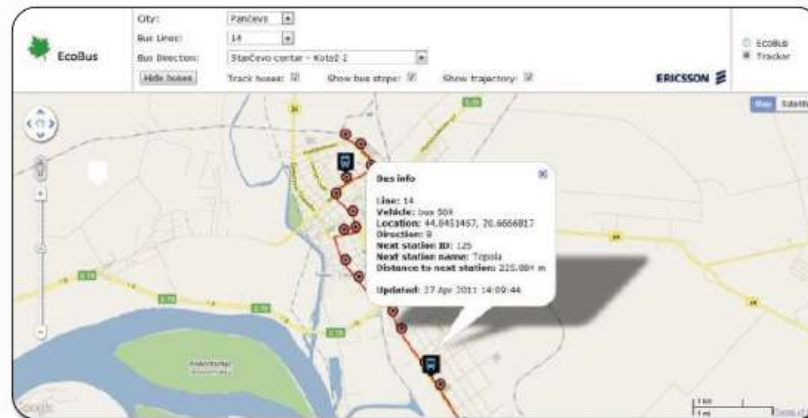
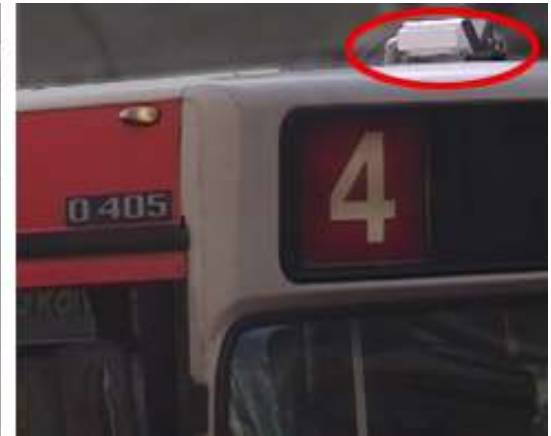
Air Quality Project

Mallorca's Harbor



Air Quality Sensing

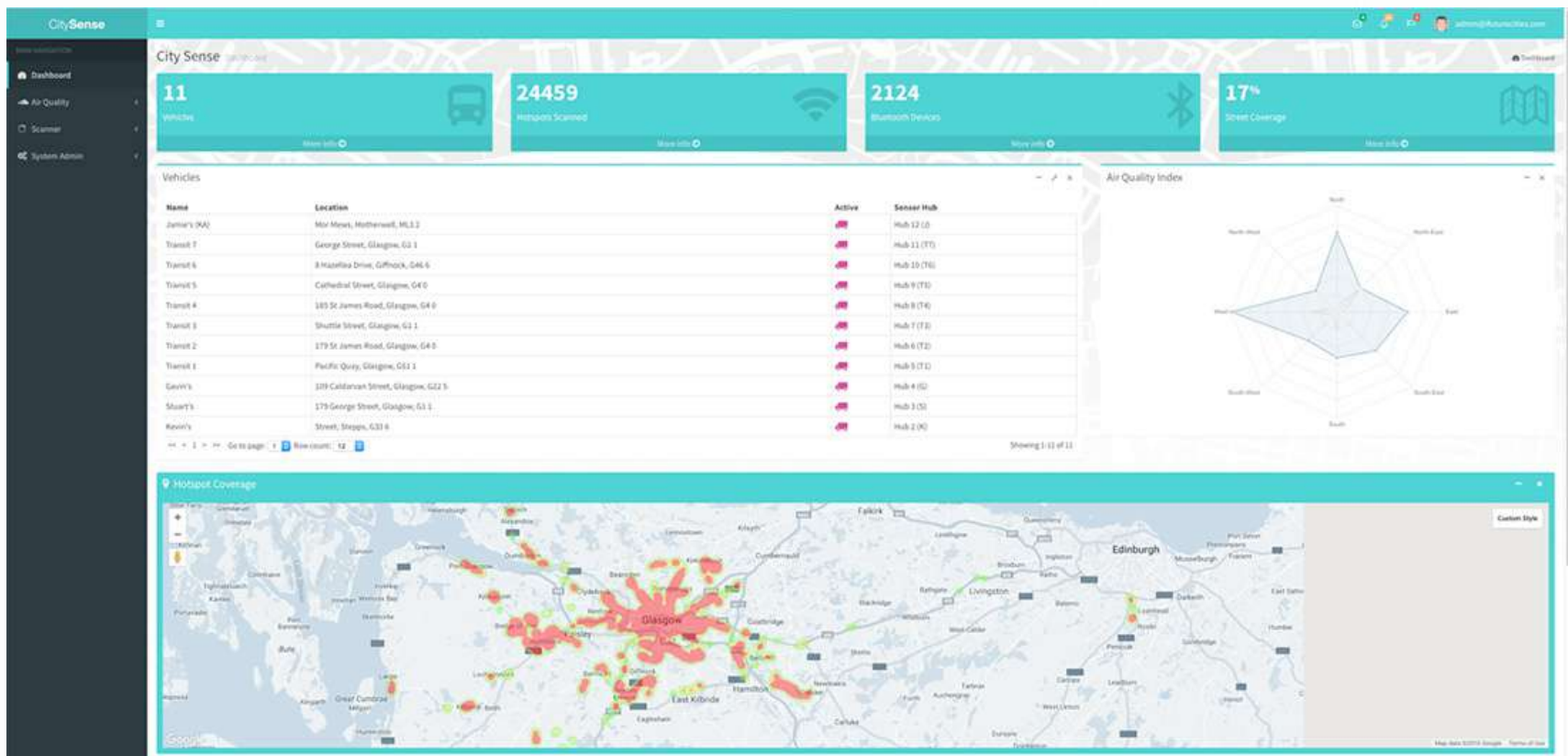
- Belgrado (Serbia)
- Air Quality
- Realtime GPS Map



Air Quality Sensing Glasgow (UK)



Air Quality Sensing Glasgow (UK)



Air Quality Sensing

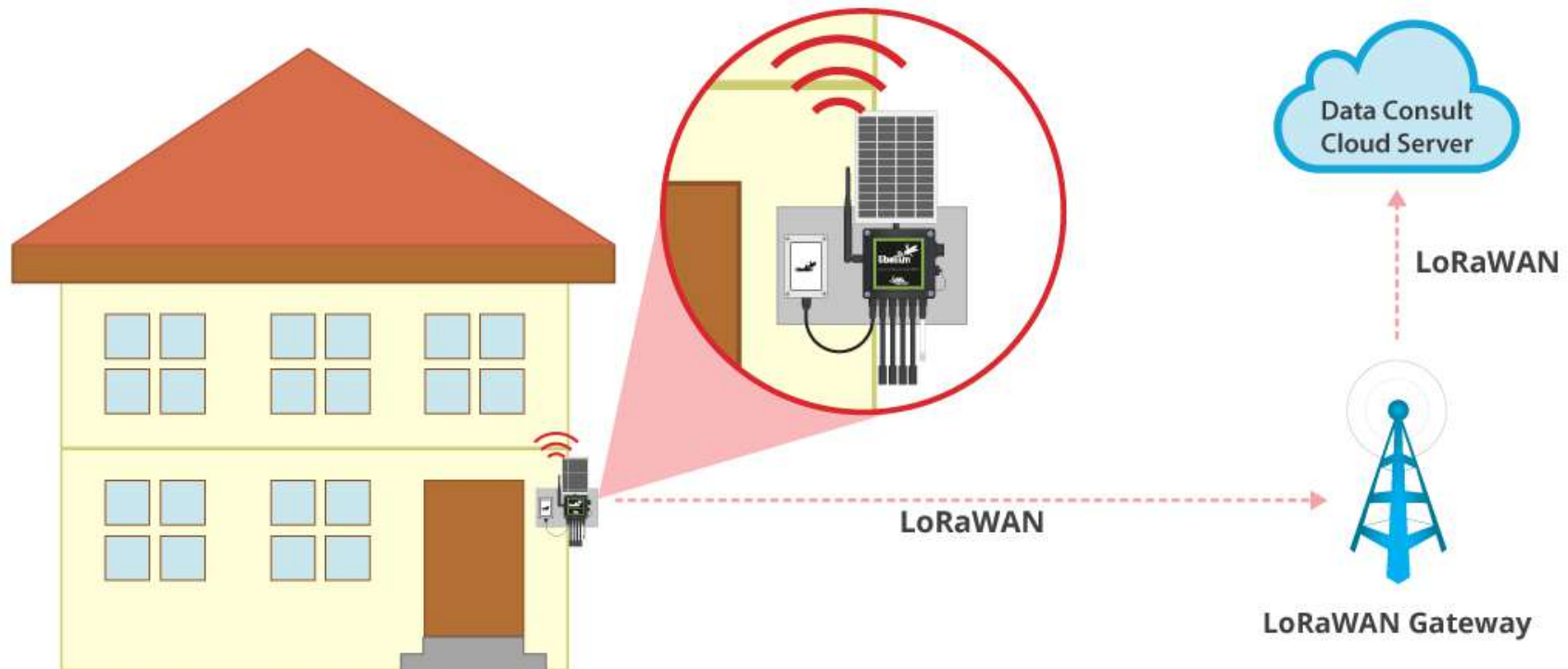
Libano (Middle East)

Price of the Houses ensure air quality standars



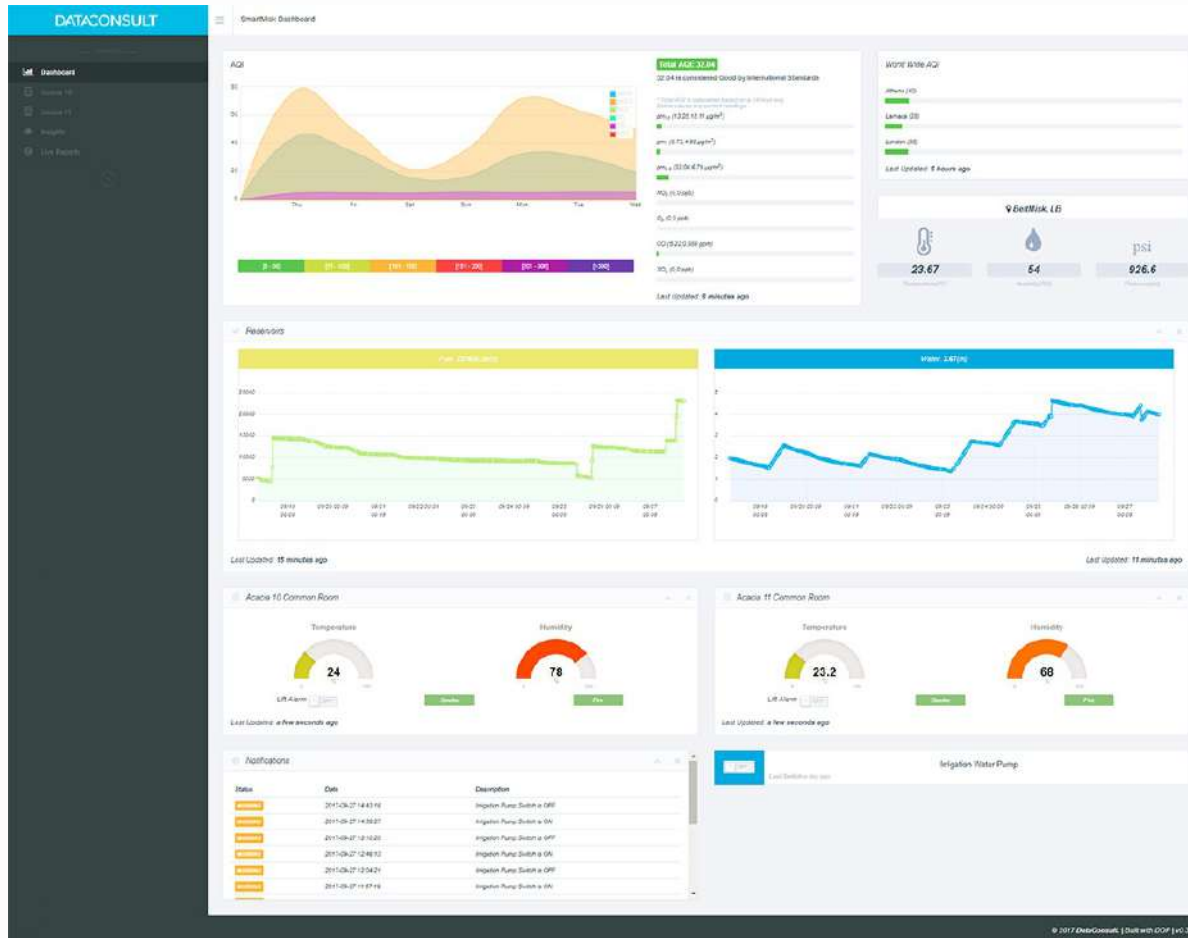
Air Quality Sensing

Libano (Middle East)



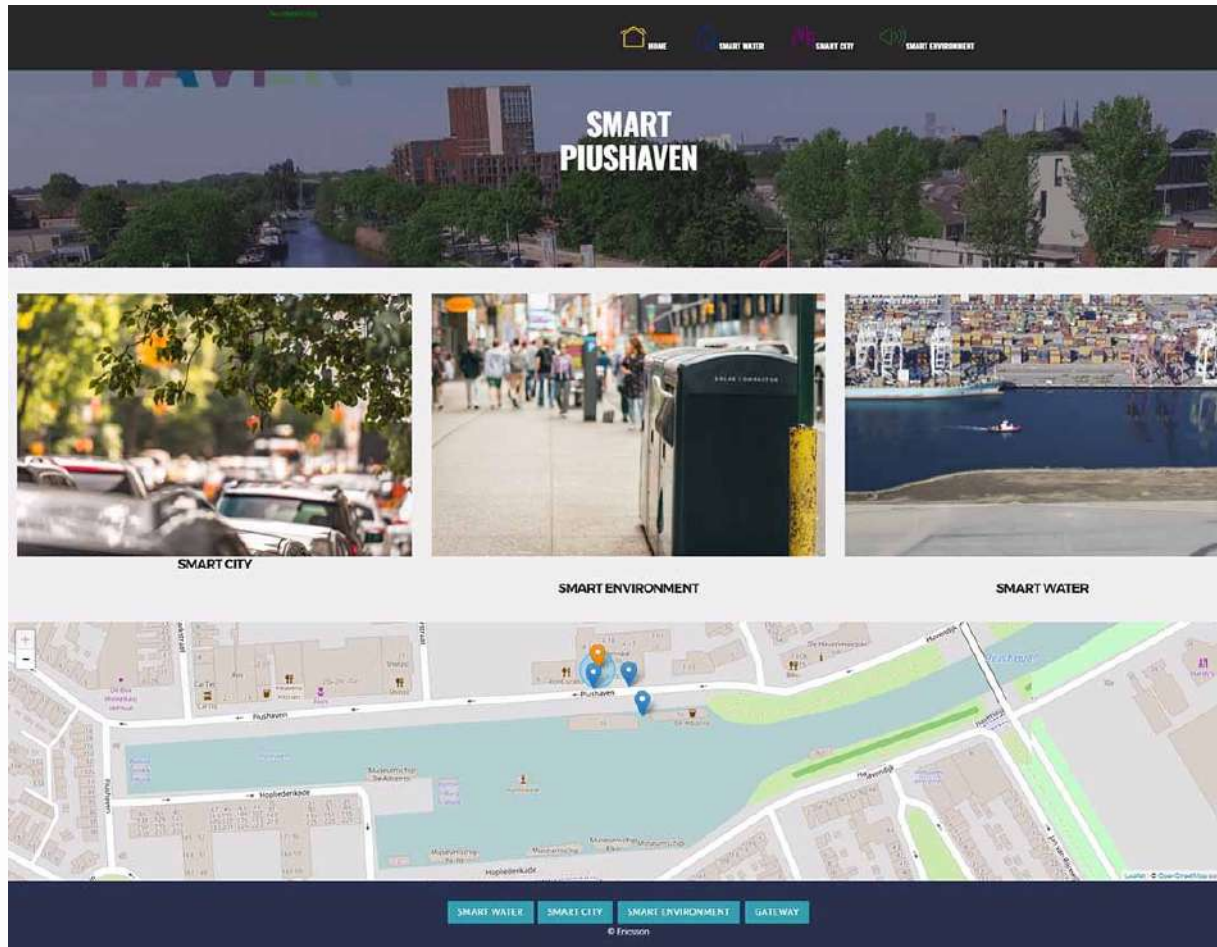
Air Quality Sensing

Libano (Middle East)



Air Quality Sensing

Tilburg (Holanda)



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Air Quality Sensing

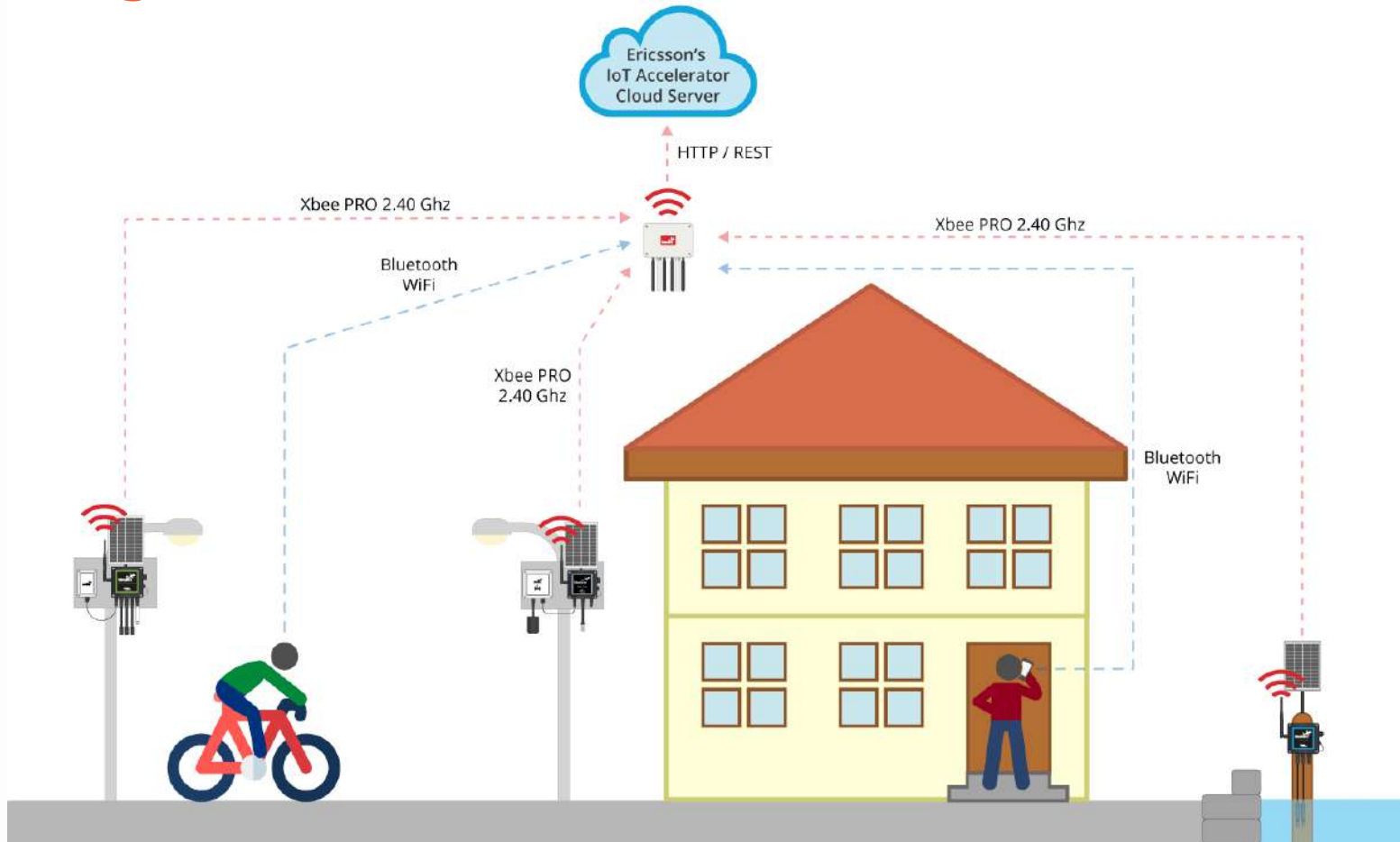
Tilburg (Holanda)



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Air Quality Sensing

Tilburg (Holanda)



Smart Tourist Location

Guertaria (Spain)



¡Trabajamos con la mejor energía!

Smart Tourist Location

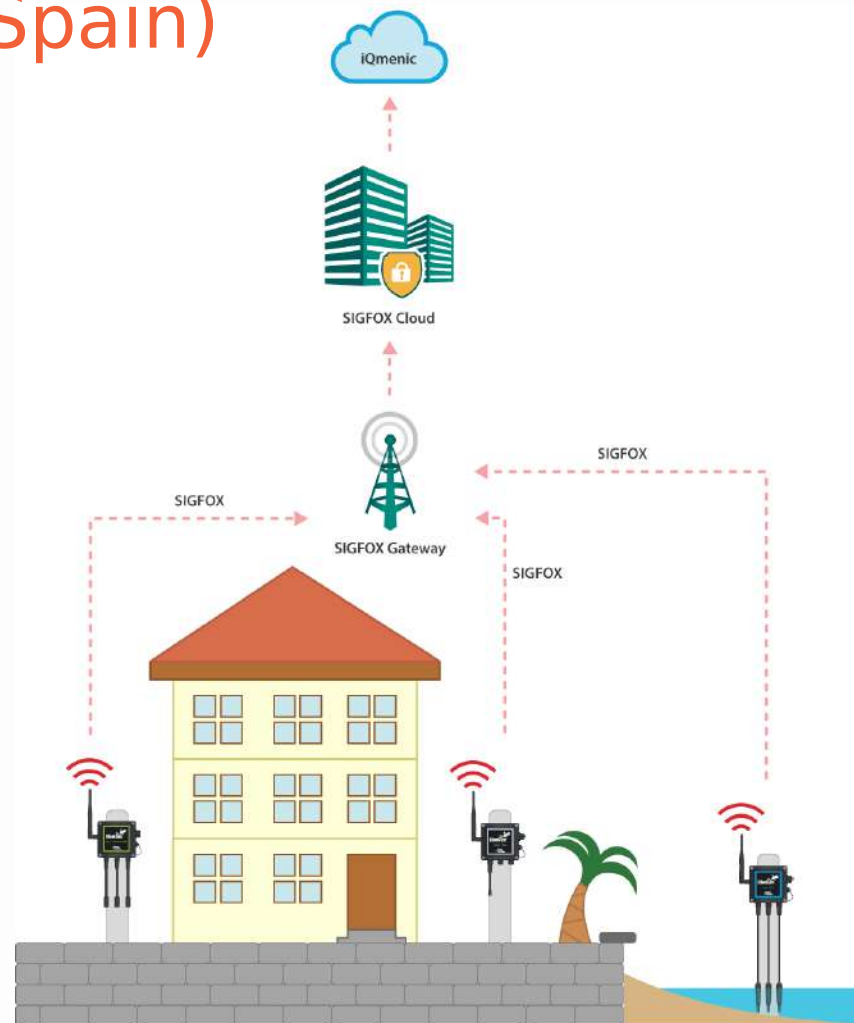
Guertaria (Spain)



¡Trabajamos con la mejor energía!

Smart Tourist Location

Guertaria (Spain)



¡Trabajamos con la mejor energía!

Smart Cities PRO (Air Quality + Noise Measurement)



Smart Cities PRO (Air Quality + Noise Measurement)



Smart Cities PRO

The main applications for this Waspmote Plug & Sense! model are noise maps (monitor in real time the acoustic levels in the streets of a city [LeqA in dBA]), air quality, waste management, smart lighting, etc.

Sensors:

- ▶ Noise / Sound Level Sensor (dBA / LeqA) + Calibration Tests
- ▶ Particle Matter (PM1 / PM2.5 / PM10) - Dust Sensor
- ▶ Carbon Monoxide (CO) [Calibrated] (low and high concentrations)
- ▶ Carbon Dioxide (CO₂) [Calibrated]
- ▶ Molecular Oxygen (O₂) [Calibrated]
- ▶ Ozone (O₃) [Calibrated]
- ▶ Nitric Oxide (NO) [Calibrated] (low concentrations)
- ▶ Nitric Dioxide (NO₂) [Calibrated] (high accuracy)
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- ▶ Ammonia (NH₃) [Calibrated] (low and high concentrations)
- ▶ Methane (CH₄) [Calibrated] – and other combustible gases
- ▶ Molecular Hydrogen (H₂) [Calibrated]
- ▶ Hydrogen Sulfide (H₂S) [Calibrated]
- ▶ Hydrogen Chloride (HCl) [Calibrated]
- ▶ Hydrogen Cyanide (HCN) [Calibrated]
- ▶ Phosphine (PH₃) [Calibrated]
- ▶ Ethylene Oxide (ETO) [Calibrated]
- ▶ Chlorine (Cl₂) [Calibrated]
- ▶ Temperature
- ▶ Humidity
- ▶ Atmospheric pressure
- ▶ Luminosity (Luxes Accuracy) for Smart Lighting
- ▶ Ultrasound (distance measurement)

New Noise / Sound Level Sensor

- LeqA (Equivalent Continuous Sound Level)
- IEC 61672 (Class 2)
- Accuracy ± 2 dB
- Waterproof
- Tested and calibrated individually in an external lab
- Test reports included



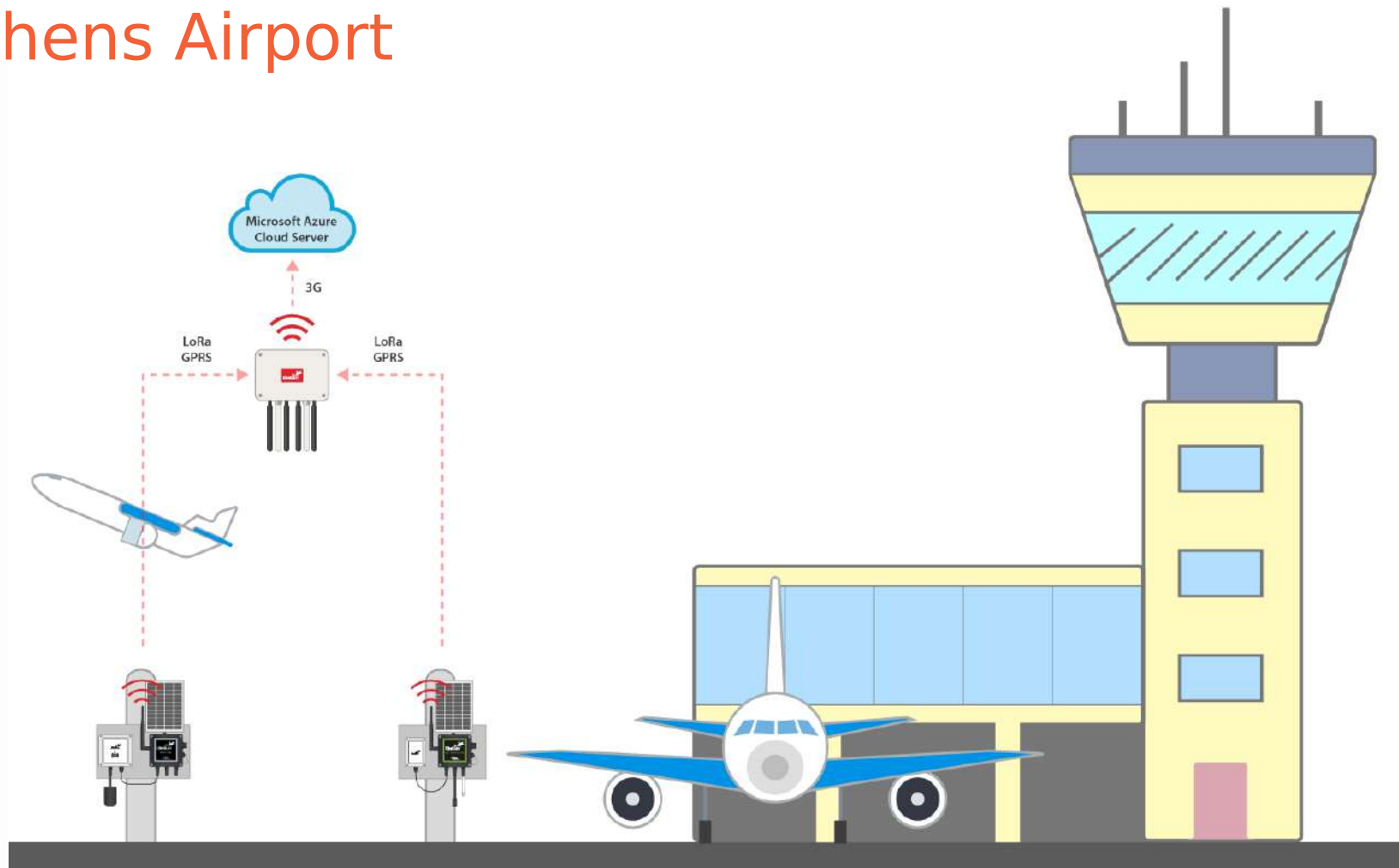
Noise Pollution

Athens Airport



Noise Pollution

Athens Airport



Noise Pollution

Athens Airport



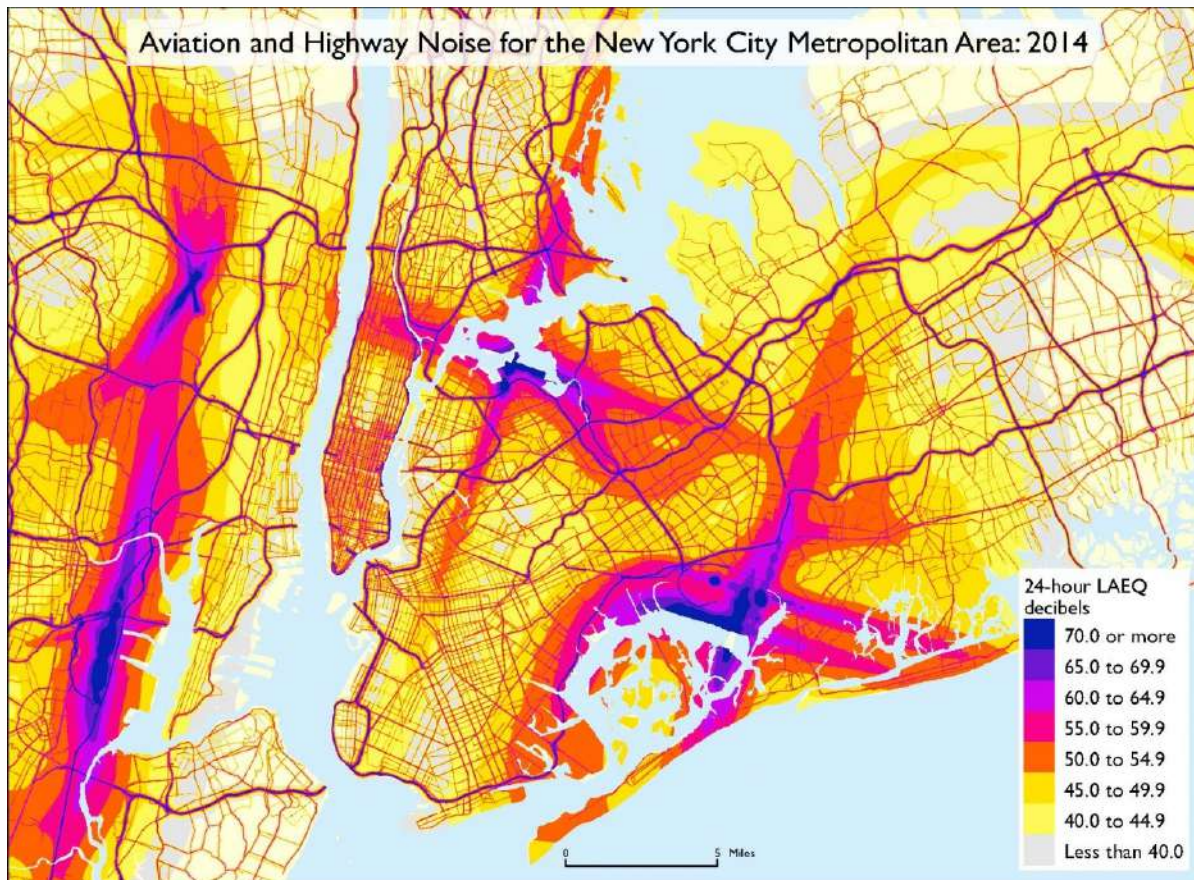
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Noise Pollution

Athens Airport



Noise Pollution



Smart Parking



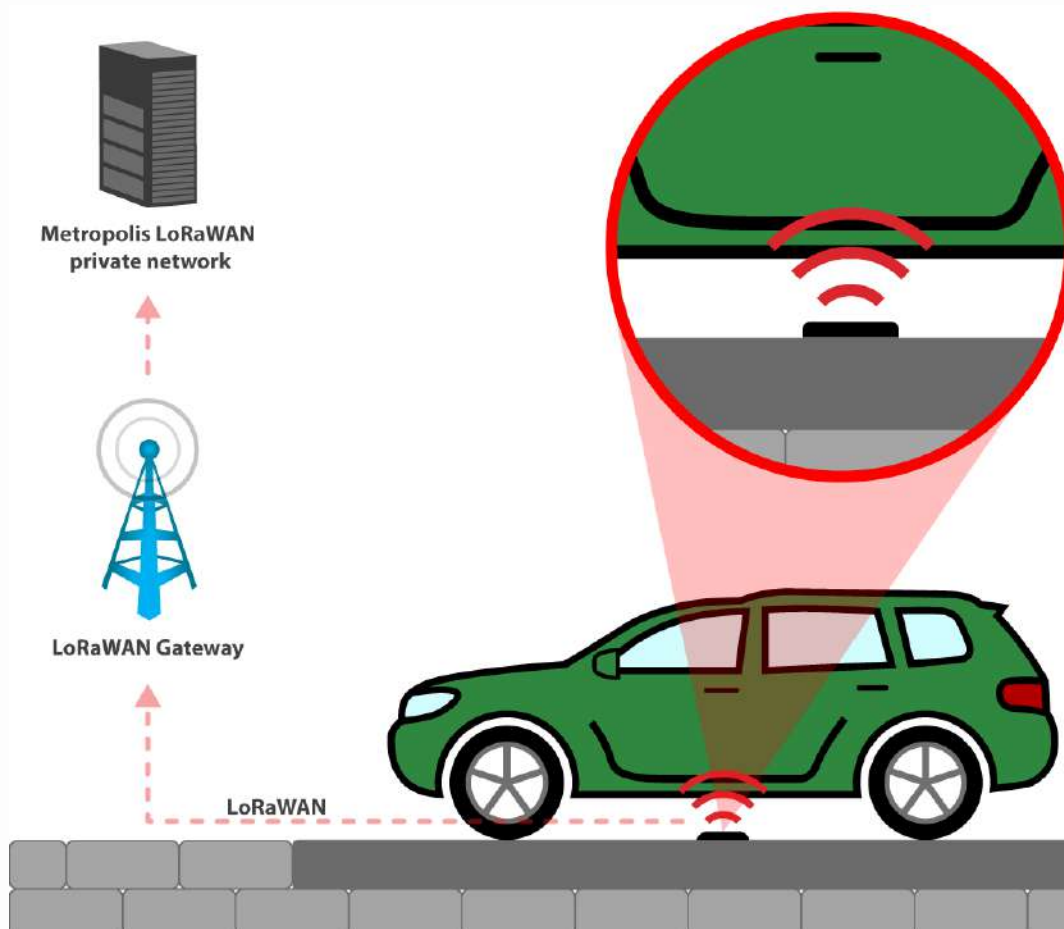
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Smart Parking



¡Trabajamos con la mejor energía!

Smart Parking



¡Trabajamos con la mejor energía!

Smart Parking



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

Smart Parking Montpellier (France)



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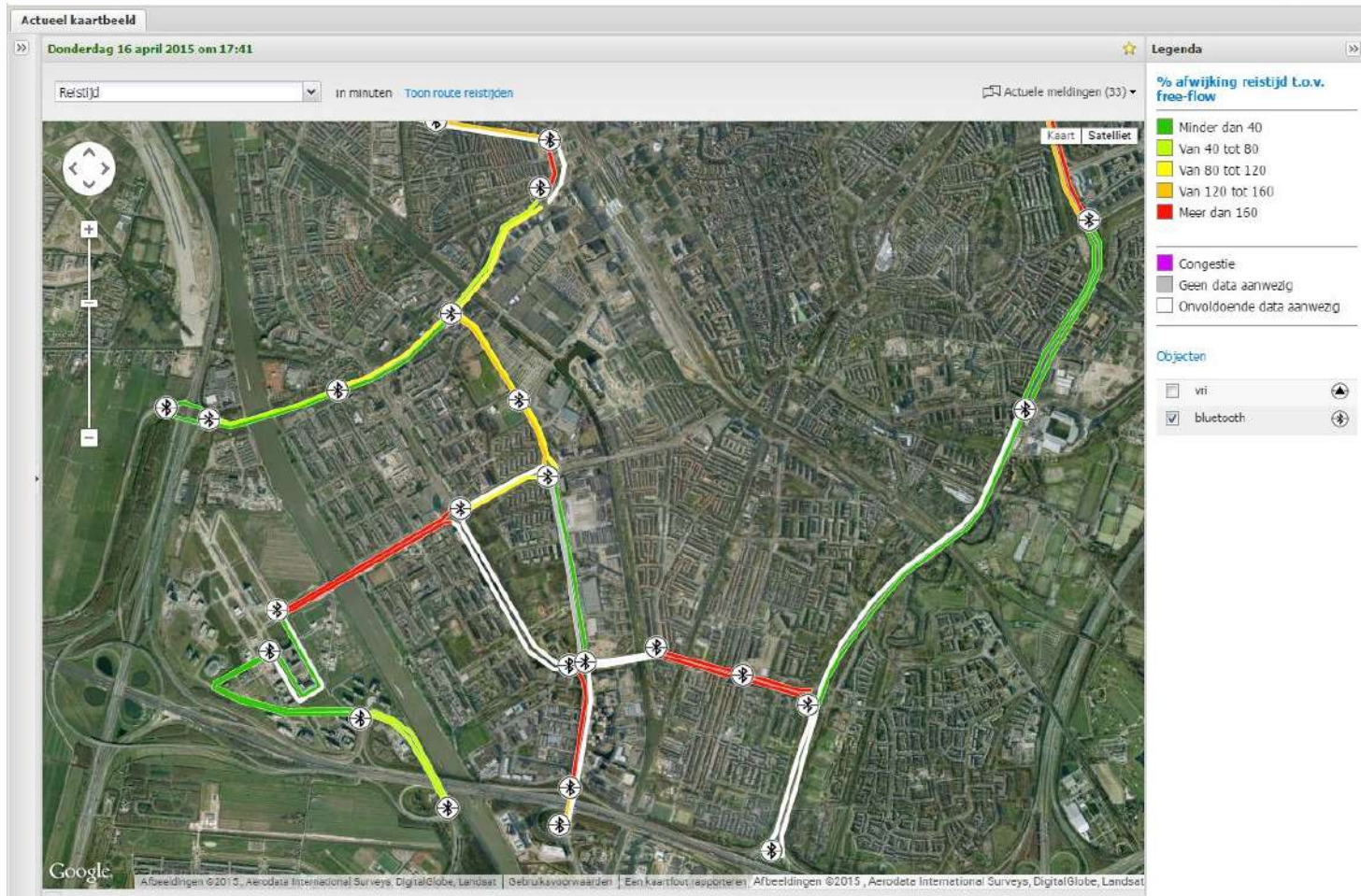
Smart Cities

Vehicle Detection in Holland



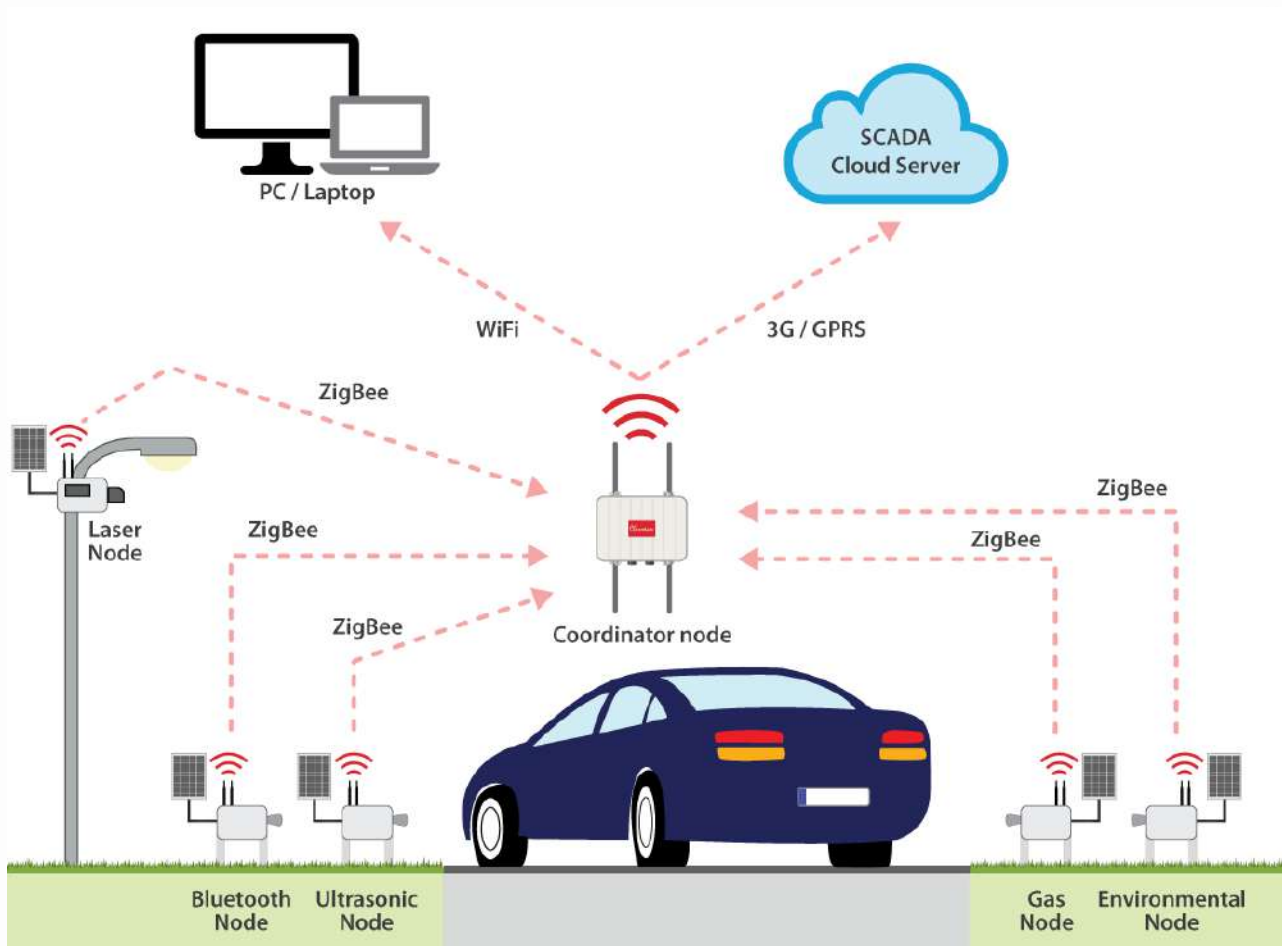
Smart Cities

Vehicle Detection in Holland



Road Conditions

Málaga (Spain)



Road Conditions

Málaga (Spain)



The screenshot displays the Meshium Viewer interface for a traffic roundabout in Málaga, Spain. The interface is divided into several sections:

- Top Left:** A data table showing sensor readings. The table has columns for id, id_wasp, id_secret, fram, fram, sensor, value, and timestamp. The data is as follows:

id	id_wasp	id_secret	fram	fram	sensor	value	timestamp
18429	N4BT	366406956	253	13	STR	20 54 76 cb 8f 3b; 58020c; -30; P;	18/09/2014 13:2
18430	N4BT	366406956	253	14	STR	20 54 76 cb 8f 3b; 58020c; -30; P;	18/09/2014 13:3
18431	N4BT	366406956	253	15	STR	00 27 13 a6 31 41; 020104; -67; O;	18/09/2014 13:3
18432	N4BT	366406956	253	16	STR	00 27 13 a6 31 41; 020104; -71; O;	18/09/2014 13:3
18433	N4BT	366406956	253	17	STR	20 54 76 cb 8f 3b; 58020c; -28; P;	18/09/2014 13:3
18434	N4BT	366406956	253	18	STR	20 54 76 cb 8f 3b; 58020c; -28; P;	18/09/2014 13:3
18435	N4BT	366406956	253	19	STR	00 27 13 a6 31 41; 020104; -65; O;	18/09/2014 13:3
18436	N4BT	366406956	253	20	STR	00 27 13 a6 31 41; 020104; -82; O;	18/09/2014 13:3
18437	N4BT	366406956	253	21	STR	20 54 76 cb 8f 3b; 58020c; -30; P;	18/09/2014 13:3
18438	N4BT	366406956	253	22	STR	00 27 13 a6 31 41; 020104; -65; O;	18/09/2014 13:3
18439	N4BT	366406956	253	23	STR	20 54 76 cb 8f 3b; 58020c; -28; P;	18/09/2014 13:3
18440	N4ULT	366406956	253	0	STR	Items 2;	18/09/2014 13:3
- Bottom Left:** A control panel with buttons for 'INICIO', 'REANUDAR', 'DETENER', 'CALCULAR MOD', 'ACTIVAR/DESACTIVAR DETECCIÓN MAC', and 'ACTIVAR/DESACTIVAR ENVIO BROADCAST'. It also shows 'FILAS 35036' and 'COLUMNAS 10'.
- Right Side:** An aerial view of a roundabout with various sensor locations labeled (e.g., N4BT, N7ULT, N8ULT, N1ULT, N6ULT, N3BT, N5ULT, N3ULT, N2BT). A central 'Matriz Origen-Destino' table is visible:

	1-S	2-S	3-S	4-S
1-E				
2-E				
3-E				
4-E				

Smart Cities

Vehicle Detection in Spain



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Smart Cities

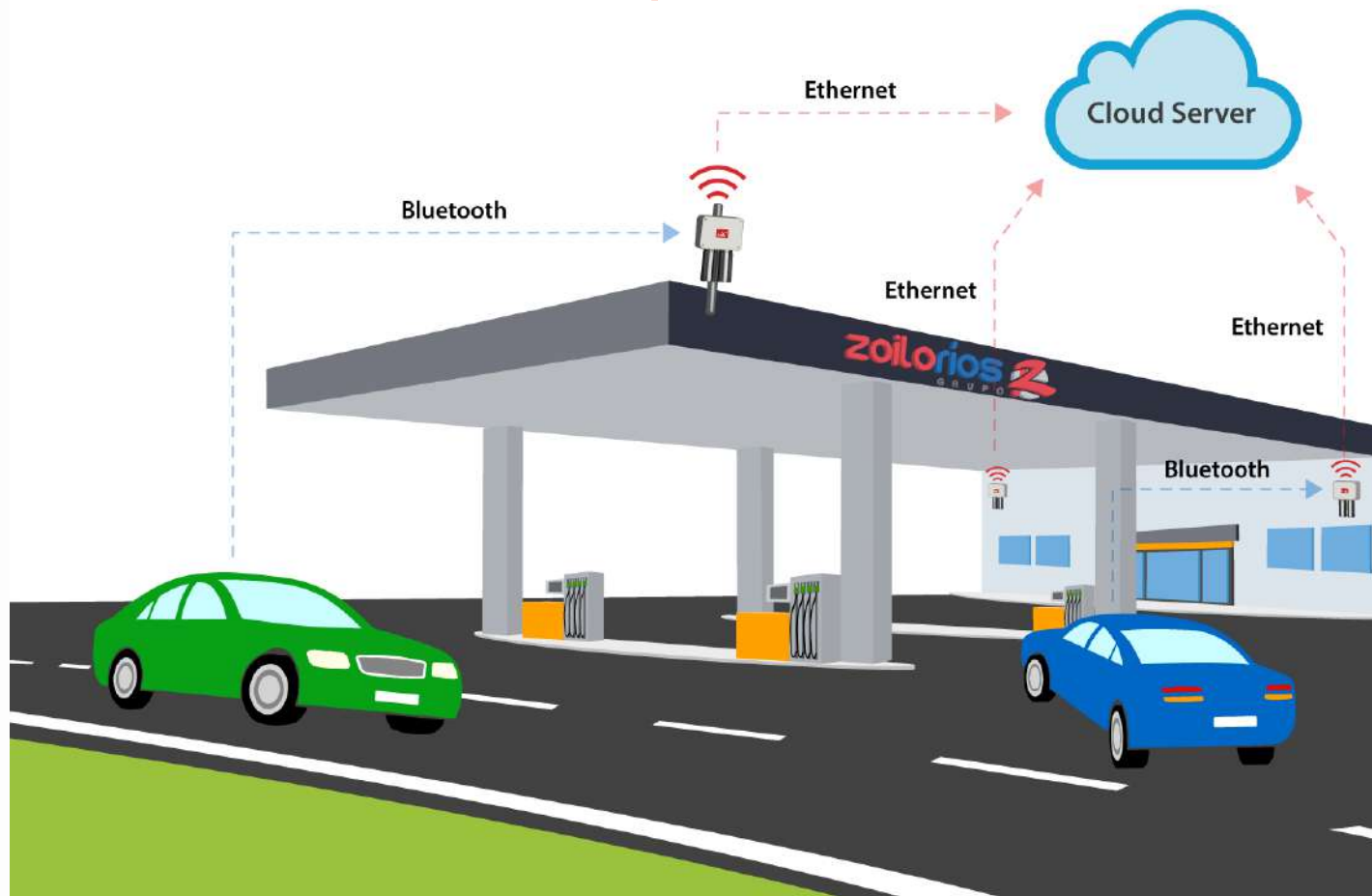
Vehicle Detection in Spain



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Smart Cities

Vehicle Detection in Spain



Smart Roads

Snow / Ice / Water Detection (UK)



¡Trabajamos con la mejor energía!

Smart Roads

Snow / Ice / Water Detection (UK)



Smart Water



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Smart Water



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Smart Water



Smart Water

Smart Water allows to monitor water quality in rivers, lakes and the sea.

Sensors:

- ▶ pH
- ▶ Oxidation-Reduction Potential (ORP)
- ▶ Dissolved Oxygen (DO)
- ▶ Conductivity
- ▶ Temperature
- ▶ Turbidity
- ▶ Calibration Kits for the sensor probes available

Smart Water



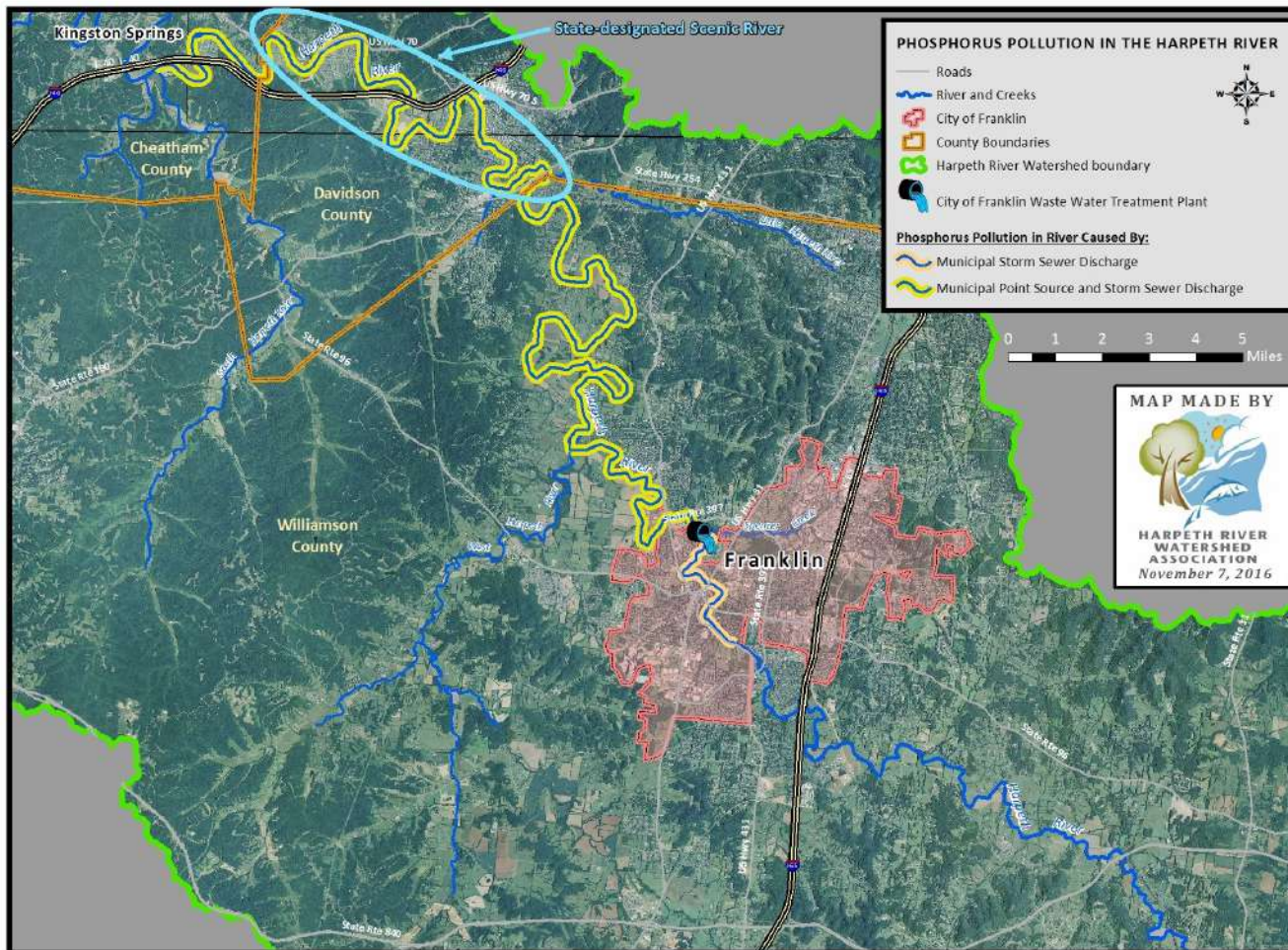
Smart Water Ions

Smart Water Ions specializes in measuring ions concentration enabling water quality control in rivers, lakes and the sea.

Sensors:

- ▶ Ammonium (NH_4^+)
- ▶ Bromide (Br^-)
- ▶ Calcium (Ca^{2+})
- ▶ Chloride (Cl^-)
- ▶ Cupric (Cu^{2+})
- ▶ Fluoride (F^-)
- ▶ Iodide (I^-)
- ▶ Lithium (Li^+)
- ▶ Magnesium (Mg^{2+})
- ▶ Nitrate (NO_3^-)
- ▶ Nitrite (NO_2^-)
- ▶ Perchlorate (ClO_4^-)
- ▶ Potassium (K^+)
- ▶ Silver (Ag^+)
- ▶ Sodium (Na^+)
- ▶ Temperature
- ▶ pH
- ▶ Calibration Kits for the sensor probes available

Realtime Water Monitoring



Salmon Monitoring Project

Oslo (Norway)



Salmon Monitoring Project Oslo (Norway)



Mussels Preservation

Ohio River (US)



Water Control in Treatment Plant

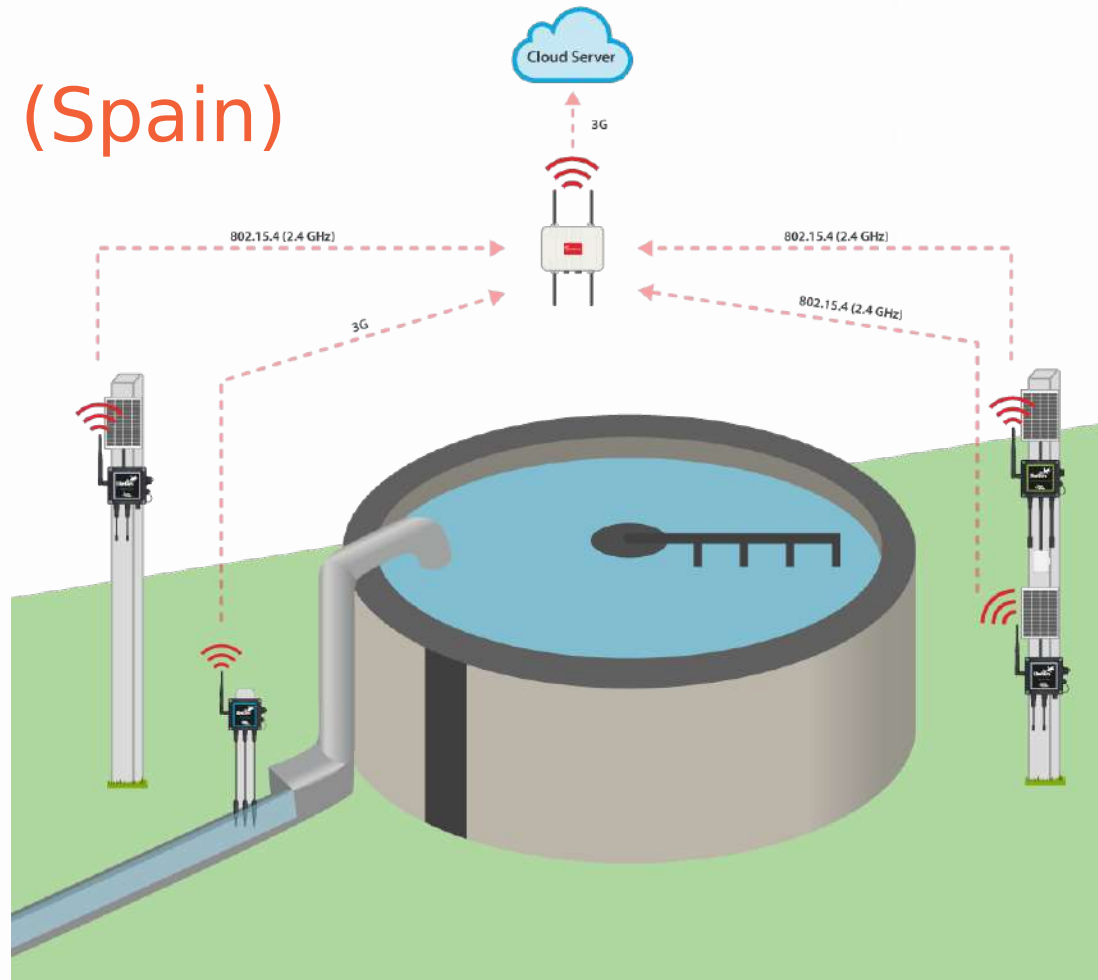
Astur



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Water Control in Treatment Plant

Asturias (Spain)



Flooding early detection



Flooding early detection

Gerona (Spain)

- Gerona (Spain)
- Water Level in rivers
- Flooding Control



Flooding early detection

La Liboriana (Colombia)



Flooding early detection

La Liboriana (Colombia)



Different Radio Technologies

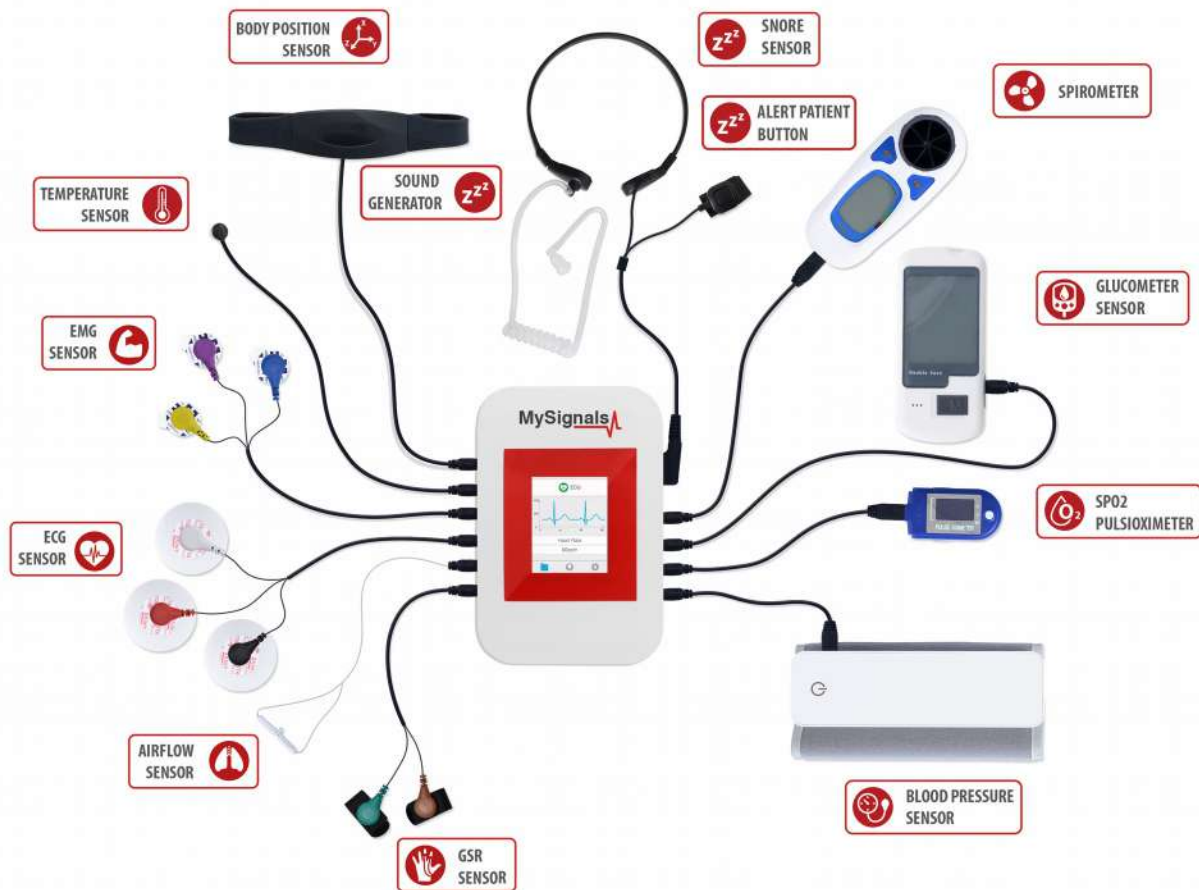


MySignals



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MySignals



¡Trabajamos con la mejor energía!

MySignals



¡Trabajamos con la mejor energía!

MySignals



MySignals Cloud

MySignals DEMO MODE

Updates Devices Members Departments Account Settings Demo User 2 (p... @ 

←  Heart Rate

Jacinthe Aufderhar

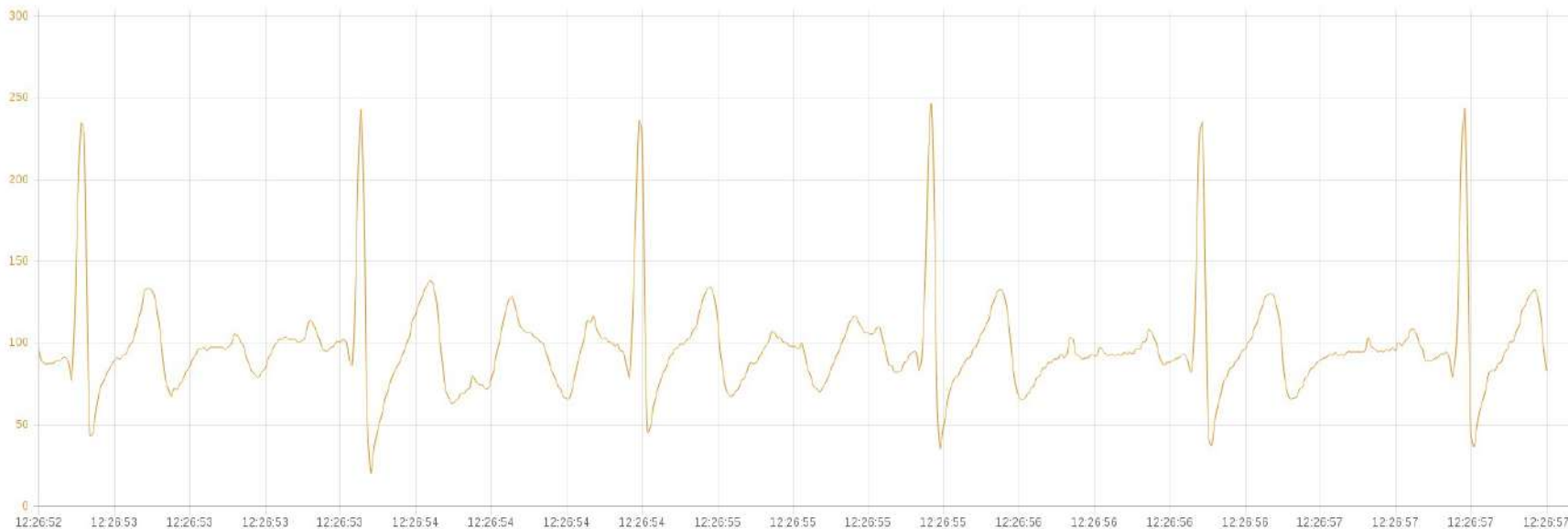
Live OFF

Day

Week

Month

ECG Wave Signal



65 bpm 

1 2 3 4 5 6 7

Animate ▶

2017-11-07 00:00:02+00:00

Time window 5 secs

Mode: Demo Real

Programming Cloud Service

PCS



The banner features a dark background with a glowing network of red and blue nodes and lines. On the left, there is a logo consisting of a cloud with a gear inside, and the letters 'PCS' below it. To the right of the logo, the text 'Programming Cloud Service' is written in a red, sans-serif font. Below this, a white horizontal bar contains the text 'Reduce development costs, increase security and speed up the time to market' in a smaller, black font. In the bottom right corner of the banner, there is a white button with a right-pointing arrow and the text 'Try the Demo now!'.

- › **Program your nodes from the Cloud!**
- › **No more code writing.** Just fill in an online form and get your binary in seconds!
- › **No more API updates** or compiler needed. Let us make the hard work for you.
- › **Our Cloud Service creates the binary** you need in real time using solid and tested codes.
- › **Create binary files based on solid and tested source codes** generated during years by the Libelium engineering team.


▶ Try the Demo now!

▶ Check the documentation

▶ Buy your license!

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Programming Cloud Service PCS




 Programming Cloud Service - Waspnote - Plug & Sense!

License in use: PCS Basic [↗](#)

Templates



sc_18

Template Name:
sc_18


 Serial ID *  




Device #1432043543805074 - 1432043543805074

Serial ID: 1432043543805074




 Node name 

SC-001

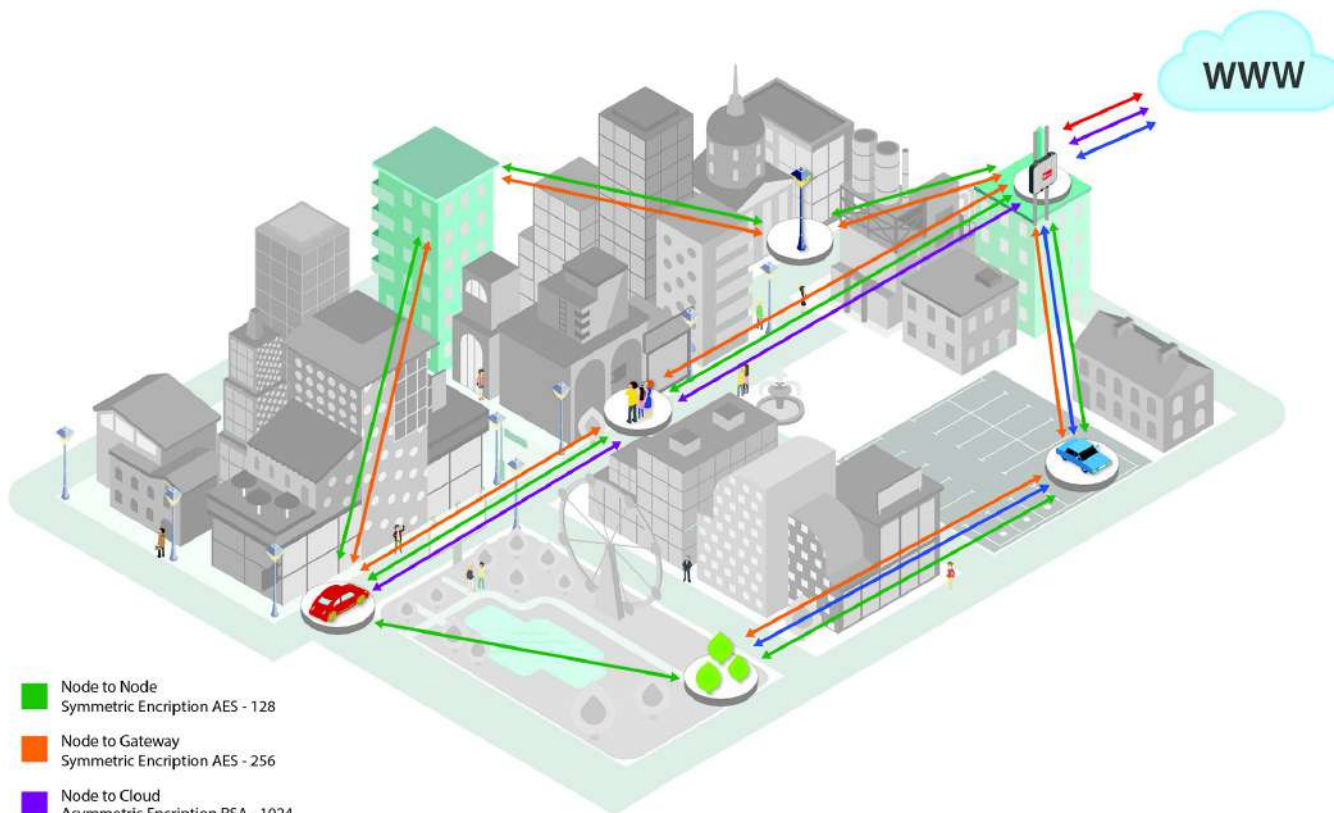
 This field is not mandatory. If this field is filled, less payload size will be available. It is recommended to rely on the Serial ID for identifying your devices.

 Select model *  

Board model:
Smart Agriculture

 Select sensor by socket *  

Security Layers



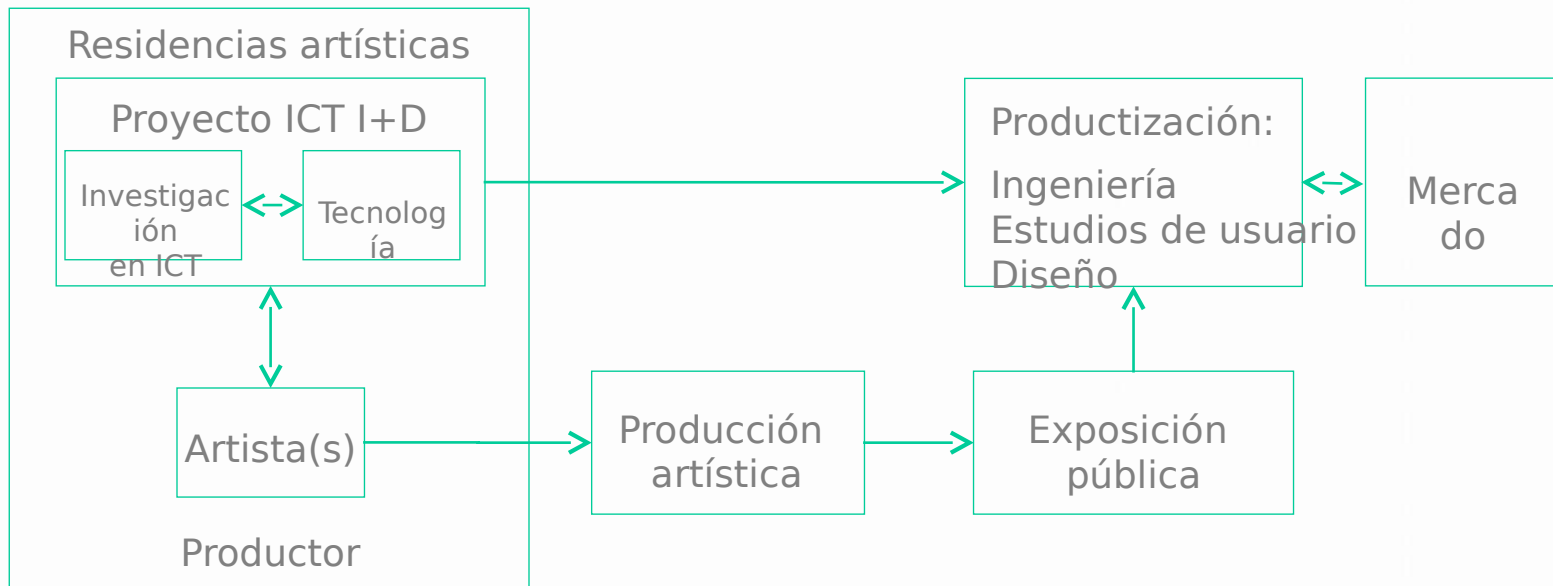
- Node to Node
Symmetric Encryption AES - 128
- Node to Gateway
Symmetric Encryption AES - 256
- Node to Cloud
Asymmetric Encryption RSA - 1024
- Node to Cloud
Symmetric Encryption AES - 256
- Gateway to Cloud
Secure Web Server Connection HTTPS-SSL-SSH



STARTS Residences & Tech Projects

starts.eu

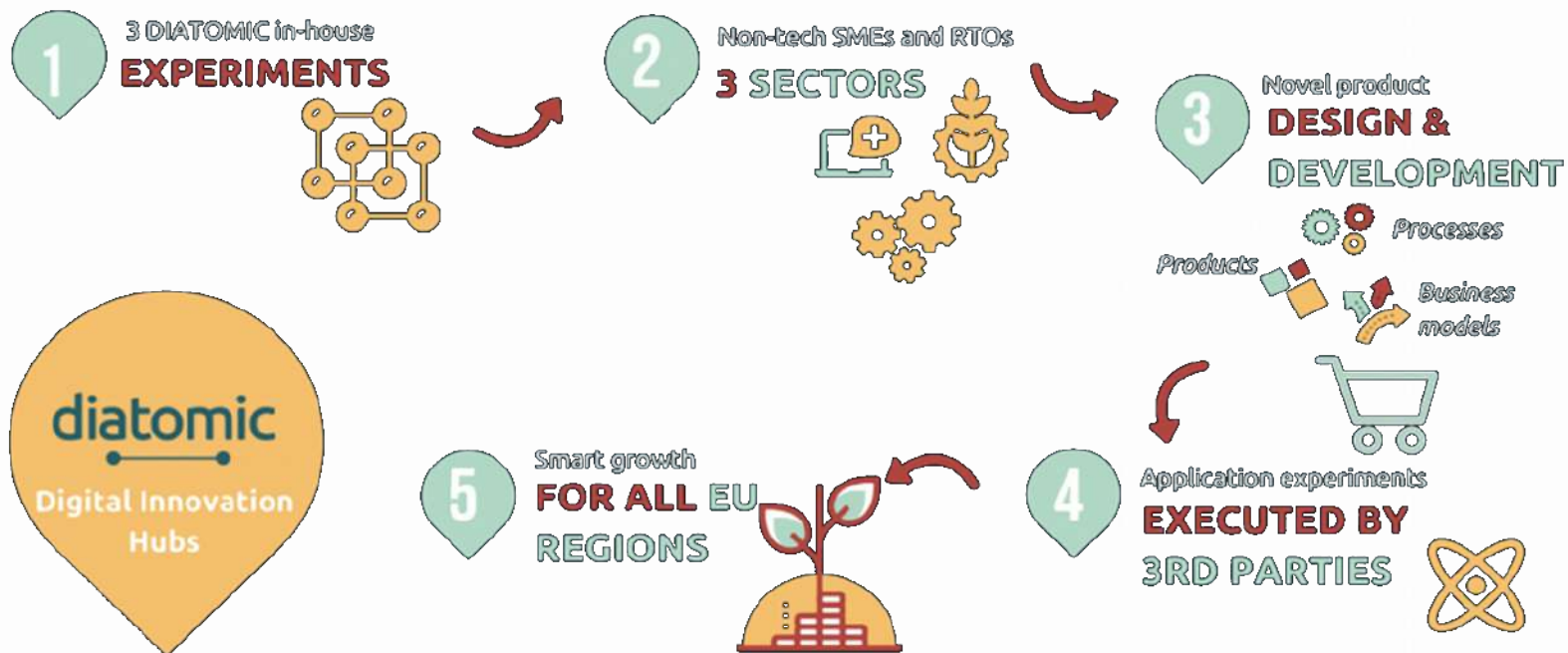
starts



DIAMOTIC

diatomic.eu

diatomic





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