

Smart Cities: Challenges and Opportunities

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Introduction



OPPORTUNITIES



Through the use of technology, Smart Cities provide better public services, to more citizens and at lower costs, thus achieving:

- More equity in the provision of public services
- Improvements in the quality of life of citizens
- Enhancing a new industrial sector, with huge potential of internationalization

CHALLENGES



Spain has a RELEVANT position in:
1) Standardization: CTN 178 UNE
2) Governance model for all stakeholders
3) Open call for municipalities

4) Industry: leading + emerging

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200 million € investment		# projects	Budget
Smart Cities & Islands		28 projects	95,8 M€
Smart Territories	32	25 projects	73,97 M€
Smart Buildings		8 projects	32,06 M€

Achievements	Acknowledged leadership.
	 Number and quality of Smart Cities.
	 Coordinated effort: Industry, Government and Cities.
	 Industry Strengthening.
	 Smart City Model: holistic approach.

Sixty one projects ongoing nationwide



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Red.es Projects of Smart Cities, Islands, Territories and Smart Buildings

Call and selection of projects.



- Financing.
- Technical Specification.

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- Procurement.
- Management and coordination of projects.



- Impact assessment.
- Diffusion.
- Reuse of solutions.
- Promotion of standardization.



UNE Standards, a key factor to achieve economies of scale and to ensure that investments are future-proof

The **CTN 178**, technical standardization committee in which municipalities, industry and experts play an active role, foresaw back in 2012 the importance of interoperability of the city platform, and produced the UNE **178104 standard**, which allows the implementation of the Smart City model, avoiding silos and gathering all relevant data from different sources in order to make better and more informed decisions.

Smart City Platform









Smart Waste Management





Receives real-time data from sensor devices on the ground. The system transforms the data into actionable information.

Use Case Goal

Optimize collection routes: turns manually scheduled routes into fully optimized ones.

- El Hierro
- Fuerteventura
- Las Palmas
- Valencia
- 🖵 Lugo
- Murcia
- Dip. Córdoba
- Lloret Mar
- Dip. Pontevedra

Smart Lighting





Streetlights with sensors and connected to a management system to adapt lighting schedule to the lighting zone.

Use Case Goal

Makes maintenance and control of street lamps more straightforward and cost-effective. Safer cities.

- Fuerteventura
- Valencia
- 🗖 Lugo
- Murcia
- 🗖 Gijón
- Rivas
- Lloret Mar
- Ourense
- Salou

Smart Air Quality





Sensors gather data on the amount of CO2, nitrogen, and sulfur oxides, while the central platform analyzes and visualizes sensor readings, maps of air quality are viewed to point out areas where air pollution is critical, so that recommendations for citizens can be issued and steps can be taken.

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Smart Noise Measurement





Use Case Goal

Noise map for location of areas of noise above recommended levels.

Cities

- Murcia
 Rivas
 Calviá
 Valencia
 - Arona

Noise in outdoor environment is caused by transport (e.g. motor vehicles, aircrafts, and trains), industry (e.g. machines) and recreational activities, and must be kept below recommended levels.

Smart Watering





Use Case Goal

Adjust the quantity of water used, and lower the municipal water bill.

Cities

- Palencia
- Rivas
- Dip. Córdoba
- Lloret Mar
- Salou
- Las Palmas

Setting up the system with all the species in each park and their water needs, checking the watering systems and installing water and humidity sensors, placed at different points in every green area. Data from the sensors, combined with data from meteorological stations, make it possible to open and close the electronic valves controlling the watering process, to water the plants with the exact amount of water that they need.

Energy efficiency in buildings



Use Case Goal

Reduces energy consumption in buildings, including heating, airconditioning, oil, water, gas.

Cities

- Mallorca
- Palencia
- Lugo
- 🗖 Gijón
- Segovia
- 🖵 Rivas
- Dip.Córdoba
- 🗖 Adeje
- Benidorm
- Lloret Mar
- S. Bartolomé



Real time measurement of energy needs and consumption, aimed at minimizing the use of energy in buildings, thus reducing the energy bill, increasing comfort of dwellers, and reducing the impact on the environment, remarkably cutting down CO2 emissions.





Smart Mobility





Smart Parking





Sensors gather the real time parking availability information, which allows to visualize occupation data, and provides guidance to drivers through an application with georeferenced information of free places and their location.

Use Case Goal

Reducing parking search time.

Improves: emissions, stress levels for drivers and citizens and presence of vehicles.

- 🖵 Las Palmas
- Lugo
- Murcia
- □ Villanueva Serena
- Adeje
- Eivissa
- Lloret Mar
- Ourense
- Plasencia
- Puerto de la Cruz
- Huesca
- Man. Salnes
- 🖵 Arona

Traffic flows





Plates recognition. Access control



Use Case Goal

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Automate access to the historic quarter and improve their mobility conditions, reducing traffic accidents and congestion, as well as pollution and noise.

Cities

- Alicante
- 🖵 Rivas
- Lloret Mar
- Nijar
- Alcalá la Real
- Toledo

License plates are detected by traffic cameras. Only authorized vehicles are allowed to enter certain areas of the city, in order to keep traffic intensity below congestion levels (to the historic quarter for example).

Smart Taxis Ranks

Taxi Stop

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Use Case Goal

Taxi availability for improved citizen and tourist satisfaction.

Cities

Valencia

Plasencia

Parking sensors will be deployed at high-impact taxi stops in the city, in order to provide real-time information on taxi availability

Smart Platform

App

Smart Bus Stop

Control Equipment

Bus Stop



Use Case Goal

□ Show Public Transport Information.

Cities

PlasenciaMallorca

Smart bus stops are connected to central services and provide dynamic, static and contextual information to users.

Smart Platform

App

Fleet Management

Control Equipment

Connected Fleet

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Use Case Goal

 Resource management
 Improve route design

Cities



Monitoring the entire fleet of public transport vehicles, ensuring optimized resource management, improving route design and anticipating needs.

Smart Platform

App

Traffic Big Data





Mobility and transport data analytics, with the objective of monitoring the occupancy levels in car parks, the inflow of vehicles in the municipality, the usability of public transport and traffic flows. Analytics provide information that can be used to identify patterns of behaviour according to temporal, geographic and seasonal variables.

Use Case Goal

- Parking prediction
- Optimization: mobility services, public transport resources, time slots or routes

- Salou
 Puerto de la Cruz
- Huesca









Smart Cities produce data from a number of sources, such as urban mobility, environment, energy consumption and from presence or positioning sensors, among many others. Raw or processed information can be shared with citizens and businesses and can be reused to generate economic value.

Use Case Goal

Data managed or generated by the public sector are made available to citizens and businesses in easy-tomanipulate formats.

- El Hierro
- Eucrementaria
- Mallorca
- Palencia
- Valencia
- Lugo
- Gijón
- □ Valladolid
- □ Cáceres
- □ Zaragoza-Madrid- □ Dip. Pontevedra Coruña-Santiago
- Ponferrada

- Segovia
- Dip. Córdoba
- Rivas
- Avilés
- Adeje
- Calviá
- □ San Bartolomé
- □ Alicante
- Dip. Badajoz
- Dip. Valencia





Use Case Goal

Services information

Cities

- Arona
- Valencia
- Dip. Córdoba
- Palencia
- Santander
- Adeje

Application for smartphones, which integrates all services and information of interest for citizens and/or tourists.

✓ Geo-located and real time information: buses, bikes, monuments, parkings, trash containers...
 ✓ City Council applications.
 ✓ Customized alerts: Traffic, City, Emergencies.
 ✓ Etc.

Big Data for City Management





Smart cities gather a huge amount of data, coming from many different sources, either structured or unstructured. Big data is capable of processing all that data, producing indicators and scoreboards that can be used to make better informed decisions.

Data from external sources such as the Internet and social networks can provide city managers with useful information on the perceived quality of city services, and the needs of citizens and tourists.

Use Case Goal

- Dashboards for city management.
- Information from the Internet and social networks.

- Valladolid
- Alicante
- Mallorca
- Zaragoza-Madrid-Coruña-Santiago
- Bilbao
- Conil
- Nijar
- Puerto de la Cruz
- San Bartolomé
- Dip. Alicante
- Dip. Badajoz
- Dip. Cádiz





Citizen 360°





Use Case Goal

Improve citizen satisfaction.Increase Quality of Service.

Cities

- Santander
- Las Palmas
- Murcia
- Ponferrada
- Dip. Pontevedra
- Salou
- Gijón
- Valladolid

Development and implementation of the 360° Citizen concept in order to have a comprehensive information of the citizens, their activities and interests, in order to provide them with personalized services, adapted to their needs.

Citizen participation





Conceived as a channel for compilation and dissemination of municipal information, allowing citizens participation and collaboration with the local administration.

The application will allow citizens to communicate suggestions, complaints and incidents.

Use Case Goal

Citizen gives feedback to Smart City system.

- Zaragoza-Madrid-Coruña-Santiago
- Fuerteventura
- Palencia
- Santander
- 🛛 Gijón
- Valladolid
- Mallorca
- 🖵 Adeje
- Benidorm
- Bilbao





Tourists profiling



Profile Pevices Person and of tourist APP Store Surveillance

Use Case Goal

Personalize services and offers for tourists.

Cities

- Cáceres
- Calviá
- Lloret Mar

Analytics applied to data gathered from service providers (banks, mobile operators, utilities, etc.) can assist in the characterization of tourists: their origin, their final destination, what and when they visit with details of dates and times, as well as the average of their stay, their expenditure, the preferred shops, monuments, etc. This information, once analyzed, can be used to improve the offer of services to tourists.



Use Case Goal

Display Tourism InformationProvide guidance

Cities

□ Adeje

□ Almuñecar

□ Alicante

Ourense

Nijar

Bilbao

Calviá

Conil

□ I loret Mar

Plasencia

Puerto de la Cruz

- Roquetas
- 🗖 Salou
 - San Bartolomé
 - Dip. Badajoz
 - Dip. Granada
 - Dip. Pontevedra
 - Dip. Valencia



Multi-media digital signage systems that allow to transmit messages, promotions and useful information for tourists, quickly and easily. Also can be used as guiding systems in museums and tourist routes.

Tourism App





Communication channel with tourists, in order to: Display Tourism Information, Beacons support, Satisfaction surveys, Smart museums, Virtual Tourism Office, Augmented reality, Digital broadcasting of 3D videos, Pictures, Digital routes, 360° videos.....

Use Case Goal

Tourist/citizen real time information and interaction.

- Toledo
- Arona
- Huesca
- Sevilla
- 🖵 Granada
- Adeje
- Lloret Mar
- 🗅 Nijar
- Ourense
- Plasencia

- San Bartolomé
- Eivissa
- Dip. Badajoz
- Dip. Huesca
- Dip. Pontevedra
- Dip. Valencia
- Manc. Salnes

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http://greencities.malaga.eu/en/



SMARTCITY EXPO WORLD CONGRESS

http://www.smartcityexpo.com/en/home

http://www.smartislandcongress.com/en

SMART **ISLAND** world congress



https://www.congreso-ciudades-inteligentes.es/

The impact of 5G Technology





Reduced Latency (1-2 ms)
 1 million devices / Km ²
 Enhanced Moble Broadband

5G PROMISES TO TRANSFORM TECHNOLOGY AND SMART CITIES LANDSCAPE



5G NATIONAL PLAN ACTIONS INCLUDE:

- Frequency bands Licenses: 700 MHz, 3,4-3,8 GHz and 26 GHz.
- Execution of one or more calls for Experimental Deployment of 5G networks, Field Trials that allow the validation of new network capabilities and the development of applications and real use cases in areas sucha as the smart cities, health, agriculture, tourism, connected car, etc.
- Support R + D + i within the scope of 5G technologies within the framework of the Strategic Action Economy and Digital Society.

ROADMAP AND KEY ACTIONS OF THE 5G NATIONAL PLAN

2017	2018	2019-20	2020
 Public consultation 5G National Plan 	 Bidding of 3,5 GHz band Call for pilots and R + D + i actions National roadmap definition 700 MHz band 	 Development of pilot projects and use cases Mid-term evaluation and possible new actions 	 Commercial deployment 5G networks



Connected Schools Programme











Thank you!

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