

Telefonica

Smart Santander_

How a coastal town was
transformed into a digital
city of the future



Foreword_

More than half of the world's population lives in cities and this proportion is increasing day by day. As urban environments are becoming more densely populated and more complex, cities face challenges in a number of different areas: congested transport infrastructure, air quality and pollution, energy efficiency and climate change.

We believe digital technology - including connected sensors, machine to machine

communication, cloud computing and big data - can be used to help overcome these challenges, create smarter cities, and improve quality of life.

We were therefore proud to have been given the opportunity by the European Union to be lead partner in Smart Santander. Over the past three years we have worked with a consortium of public and private sector organisations to help Santander become the world's most advanced Smart City.

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Introduction



Smart Santander

01 - Introduction



Smart devices are now ubiquitous throughout consumer lives. From smart phones to smart cars, intelligent technology that is connected to the internet and, increasingly, other devices is found in every walk of life. As the technology develops, so does the ambition, and next on the smart hit list are cities.

Governments around the world are now racing to transform their towns into “smart cities” – urbanisations connected by sensors, smartphones, computers and a variety of other digital technologies designed to make them more sustainable, more efficient and better places to live.

Santander, the Spanish coastal town, has become the world’s leading smart city.

Using €6 million of research funds from the EU, the city has transformed itself into one of the largest smart experiments in the world. The project has been developed in line with the European Union’s Future Internet initiative, which involves the creation of facilities to support experimentally driven research in the field of Information and Communication Technologies (ICT).

Technology overview

Transforming Santander into a smart city was no easy feat. Around 180,000 people live in the city and with its beaches, leisure facilities, casinos and history, Santander is as much a tourist destination as it is a modern European city.

However, using the grant from the EU, a consortium of 25 partners from across Europe and Australia led by Telefónica has been able to turn Santander into a living experimental laboratory.

The project team installed more than 12,000 sensors around the city, around an area of approximately 35 km^{sq}, or 13.4 square miles. The work commenced in September 2010 and the installation was completed in October 2013, carried out over 4 different phases. The project has recently been expanded to include sensors on buses in the surrounding region, vastly increasing the scope of the

scheme to an area of nearly 5,300 km^{sq}, or 2,030 sq. miles.

Each phase contained different types of sensors depending on the final services being envisaged. A large proportion were hidden inside white boxes and attached to street infrastructure such as street lamps, buildings and utility poles, while others were buried into the actual pavement. Not all of the sensors were static; some were placed on the city's public transport network, including buses, taxis and police cars. By downloading an app to their smartphones, even the residents of Santander could become moving sensors in their own right.

Smart Santander

02 - Technology overview



These sensors measure a variety of variables, from light and pressure to humidity and temperature. Vehicles broadcast their positions in real time while other sensors measure air quality levels, for example. The sensor infrastructure deployed across the streets of Santander is wirelessly connected through the backbone network to the Telefónica M2M service

platform (IDAS/DCA, AKA Smart Business Control platform). This technology enables the network of sensors to transmit data back to the project hub as often as every two minutes. Once there Telefónica's big data platform extracts intelligence, allowing the enormous amounts of big data to be analysed and observed in real time by the Council employees.

Services Smart Santander has enabled

There are many similarities between 'Smart Santander' and role playing video games like Sim City.

The City Council is able to see, at any time, a snapshot of the entire network of sensors. The system facilitates a range of new services, such as:



Real-time view of traffic jams and available car parking spaces



Precise measurement of air quality and ozone levels across the city to ensure they are kept to within EU limits



Remote dimming of street lamps on empty streets or when there is a full moon, for example. New bulbs are also automatically ordered when needed



Optimised watering in city parks so no water is wasted



Only garbage bins that are full are collected, minimizing needless trips by municipal workers (To be deployed after Nov 2013)



Traffic jams and accidents are tracked in real time

Smart Santander

03 - Services it has enabled



Santander residents are able to add a new layer to these amenities, turning them from interesting value-add services to truly smart services. By downloading the “Pulse of the City” app, Santanderians can not only connect to the city’s data streams, but actually start to use them in new and exciting ways.

For example, residents are now able to report municipal annoyances such as potholes or damages directly to the council. To do so they simply take a picture of the problem and upload it to the authorities via the app. The report is tagged with geolocation data and the public are able to track its progress through city hall,

including how long it takes the council to rectify the problem.

Elsewhere residents’ smartphones become a remote control for the city. Santandarians can use their devices to plan their travel routes based on real time traffic information, or find readily accessible (and free) car parking spaces. They can use maps to see when the next bus is due or find out what concerts are coming up at the city hall. Those with asthma can plan their days to ensure they avoid areas with high pollution, while tourists can point their phones at landmarks to learn more about the local history.

Conclusion_

The Smart Santander project has transformed the coastal town into a digital city of the future.

Municipal officials have a real-time view of key city metrics, enabling them to make better decisions and engage in more cost-effective planning. Resources can be planned and allocated faster and more efficiently, while cost-savings can be realised more effectively.

Above all, the project allows the council to operate in a more transparent manner. It can publish data and information on its digital properties to allow Santandarians to make more informed choices about their city. Local issues are escalated faster and can be tracked online by the public and media alike, meaning the council is more accountable than ever.

For citizens, their city has been transformed from a largely static town into a dynamic, responsive urban area. The project has peeled back the layers and, for the first time, allowed residents to truly interact with their municipal environment. They are empowered to make choices based on real-time data,

allowing them to save money, time and effort.

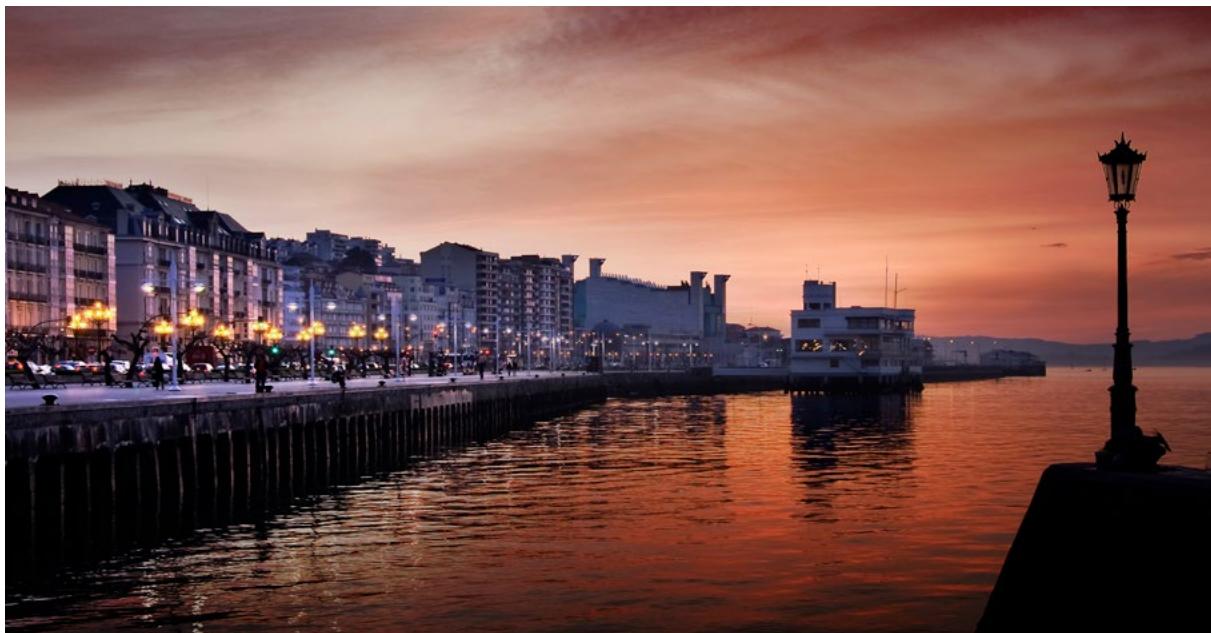
The project has been hailed as an international success, and the council has played host to peers from around the world who have come to view the experiment with a view to rolling it out in their own cities.

Telefónica's bespoke infrastructure will remain in place once the project ends and an Innovation Lab will take over the running of the project to ensure the boundaries are continuously pushed. The project has been recently extended to allow the completion of a set of four selected experiments to validate new services that could run on the platform and one day help to serve the community.

Santander is the first truly smart city, showing how digital technology can be used to make cities a better place to live. Telefónica is proud to have been part of this ground breaking programme.

Smart Santander

04 - Conclusion



What next? How long before every city is a smart city? The reality is, despite the success of Smart Santander, there are barriers which need to be addressed if smart cities are to become mainstream.

And we want to get to the point where not just every city is smart, but anyone can install connected sensors and monitor the readings remotely through a website or app and be able to put in place rules to trigger automatic actions. To give individual consumers 'smart city' technology in their homes, gardens, or workplaces.

There are 3 big barriers or points of friction. Our research and development team is working on a number of projects which will help us remove or overcome these barriers.

1) Getting more connected devices, more hardware into the hands of the developer community. We are doing this through our partnership

with Arduino, who we have worked with to develop the new Arduino GSM Shield to simplify the process of building Internet of Things applications based on mobile phone networks and controlled through the internet anywhere there is mobile phone coverage.

2) There is still only a low level adoption of connected sensors. The challenge is how do you make them affordable and accessible to a mass market. We are trying to open up this space with our 'thinking things' project. A simple modular technology which will make it easy and affordable for people to connect sensors to mobile networks. Modules are connected together and then to the device they will control

or monitor. A web page is created for the new device to provide online access to the information and to set automatic actions.

3) It needs to be far easier for the average city council employee to be able to use and act on the intelligence extracted from the data. We are developing software which enables the user to set up rules or actions. For example we have installed sensors in every traffic light in Frankfurt working with the city council. An employee can use the software to specify that if a traffic light rises above a certain temperature an email is sent to a specific person or team notifying them that maintenance is required.

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