SMART CITIES

A Powered-by-FIWARE solution to personalise citizens' urban experience

With the contribution of

Ayuntamiento de Málaga

Challenge & Context

In the <u>European Union</u>, the public sector is one of the most data-intensive areas, as it holds vast amounts of data known as Public Sector Information (PSI). Open public data are PSI that can be readily and widely accessible and re-used, sometimes under non-restrictive conditions[1]. The European Union estimates that the increasing availability of open data made available by the 27 Member States could bring an economic return of €75.7 billion, creating almost 25,000 new jobs related to the data analysis sector in the next years[2].

Private companies can benefit from the new knowledge derived from open data by improving their business models or identifying new ones. There are already many innovative services based on open Public Administrations data that users use every day on their smartphones. Thanks to open data, developers, journalists, universities and research centres have at their disposal increasingly robust and reliable information tools to understand the scope of current phenomena and carry out their work better. In addition, free access to public information by all makes it possible to create a climate of widespread transparency that improves the quality of the debate on public policies and – at the same time – makes the administrative machine more efficient.

However, data is not only important for business activities, but also essential for the private lives of citizens. Citizens can, thanks to the availability and accessibility of open public data, make use of the most meaningful information for their daily lives.

Many cities are already using data to generate services to suit the needs of each and every citizen, but which European cities are most advanced in this field?

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[1] "Public sector information sometimes refers to all the information that public bodies produce, collect or pay for. Examples are geographical information, statistics, weather data, data from publicly funded research projects and digitised books from libraries. The European Commission's policies focus on generating value for the economy and society through the re-use of this type of data". Data Policy Innovation, Unit DG.1, Open Data Study, March 2020.
[2] <u>European Data Portal</u>

Which cities are creating and using their data to improve citizens' lives? And what technologies are they using to overcome data access problems?

The City of Málaga (Spain)[3] has a substantial amount of data currently **with more than 900 datasets**. The main problem to solve is the aggregation of this data in a way that promotes **easy accessibility for citizens to a meaningful use on a daily basis**. The challenge faced is to create "components"[4] which citizens can select specifically for their own needs or interests together with the idea of creating a personalized dashboard they can use daily on any device.

The **Powered by FIWARE solution provided by the City of Málaga enriches open data** by adding **consequential information and alerts** which can then **be used to convert the instant data** into useful information which can aid user driven decisions.

Solution

The solution proposed is a personal dashboard with web components connected to each open data dataset, the user is then able to configure these "components" according to personal preferences. The solution derived is a configurable user experience whereby the citizen can choose what data to see and from which data source resulting in a dashboard displaying only relevant data. For example, one is on their way to a meeting and wishes to plan their route and see the traffic situation in real time, they can simply select only relevant components to them such as "traffic cameras" and "parking zones".

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[3] Málaga is a municipality, capital of the Province of Málaga, in the Autonomous Community of Andalusia, Spain. With a population of 571,026 in 2018, it is the second-most populous city of Andalusia and the sixth-largest in Spain. The southernmost large city in Europe, it lies on the Costa del Sol (Coast of the Sun) of the Mediterranean, about 100 kilometres (62.14 miles) east of the Strait of Gibraltar and about 130 km (80.78 mi) north of Africa.
[4] Each component allows access to specific information targeted at the needs of the individual citizen (e.g. traffic jam and parking)
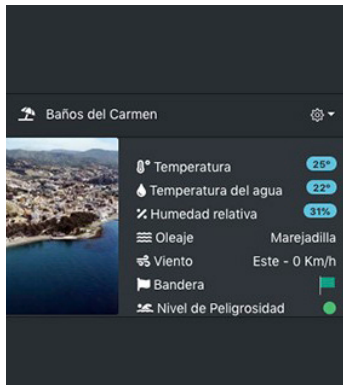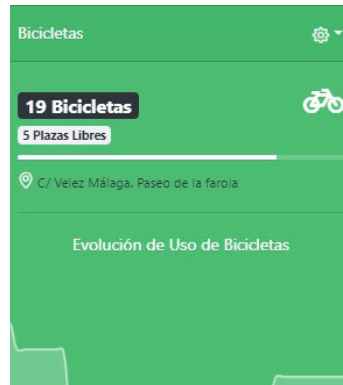
Figure 1 - Application: Beaches component

Figure 2 - Application: Bike Parking component

Figure 3 - Application: Bus Stop component

The components enable the use of historic datasets which can be queried to get max/min values or generate alerts (when a value is reached). These components have specific names that refer to specific data. Three examples of components Powered by FIWARE are:

- **Beaches** Each beach provides large amounts of data to be analysed in real time such as: flag alerts, danger of jellyfish, temperature, water temperature, humidity, swell, wind. Users can generate useful alerts for themselves such as receiving a notification when the water temperature reaches a certain value.
- **Bike Parking** Each bike station shows the number of free and available bicycles for renting. With FIWARE, the city of Málaga can also analyse the historic trends.
- **Car Parking** Each parking area shows the current occupation level by indicating the number of available spaces out of the total maximum capacity for each area. All data collected is fed into FIWARE which allows the Municipality to analyze occupancy trends and thereby offer insight into typical times of the day when parking is likely to be more difficult or experience higher volumes. Other components include:
  - **Bus stops** Showing when a certain bus is expected to arrive at a bus stop. The user can plan ahead by selecting relevant bus routes and stops according to their current position and see the expected arrival times for each bus.
  - **Traffic Cameras** The user can select several cameras on his/her route to work, for example, in order to see in real time the traffic situation of that particular route and plan accordingly.

- **Layers of the Geoportal** More than 80 different geoportal layers can be added by the user such as tourism related layers which include touristic locations (e.g. theatres, museums, galleries), or sports venues (e.g. sport fields, street workout zones), environment-related areas (e.g. recycling zones), health emergency spaces (e.g. location of defibrillators).

How it works

The solution has a front-end framework and backend to make it available through the web.

The backend works with a docker component, Málaga NGSI[5], which obtains information from different sources (open data portal and beach information) and pushes the data with different update frequencies to FIWARE Context Broker[6]. Cygnus subscribes changes in Context Broker (named Orion) to obtain the update of data such as parking occupation, beach information or bike parking availability. Cygnus uses a second mongoDB different from Orion.

STH-Comet has access to mongoDB where Cygnus updates the historic data. The frontend query Context Broker to get Entities and STH-Comet in order to use the historic information. Figure 4 shows the backend architecture.

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[5] NGSI is a protocol developed by OMA to manage Context Information.
[4] The FIWARE Context Broker, which is able to handle context information on a large scale by implementing standard REST APIs, has been, beside others, added to the European Data Portal and its core service platform as a new functionality, allowing the European Data Model and EU Member States to collect, manage, use, and share real-time data. Context Broker is also named Orion Context Broker.
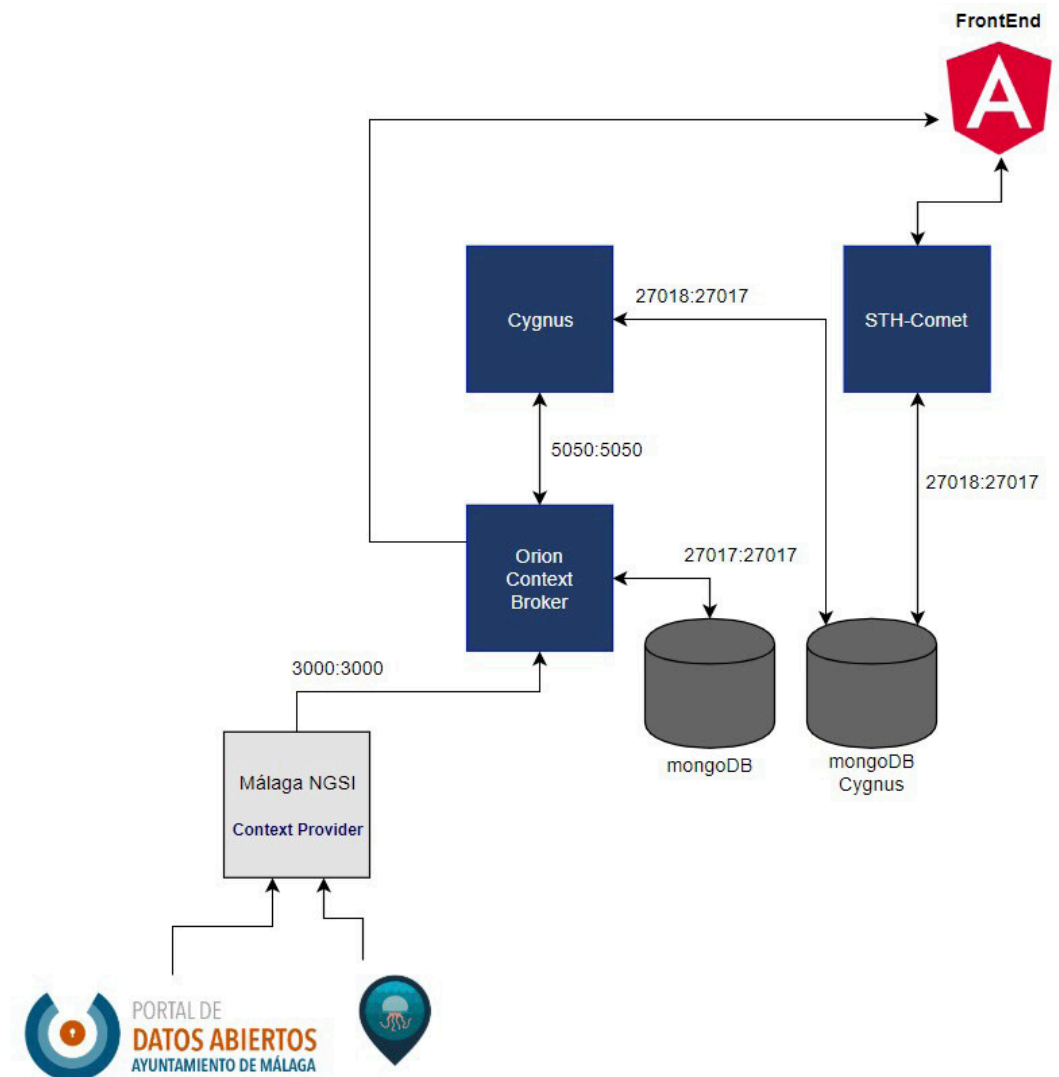
Figure 4 - Backend Architecture

The frontend is an Angular application which implements a component for each element represented in the dashboard as an intuitive and pleasant interface, as well proving efficientlz storing, presenting, and updating data received from the back end or API. It can access FIWARE data and also other services such as cameras or georeferenced data.
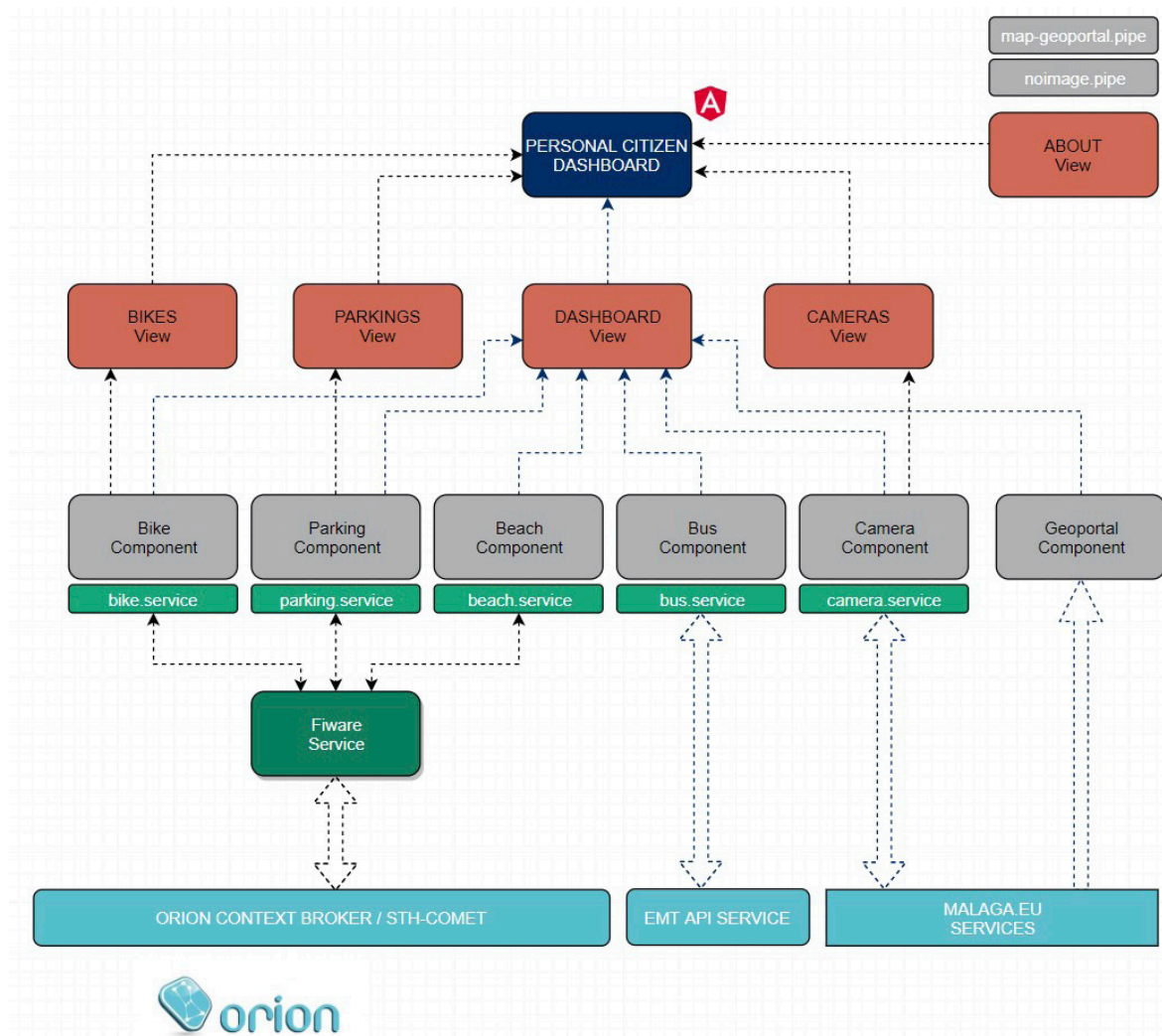
Figure 5 - Functionality

Each Angular component has its own structure which will be published in the future to permit external developers to create components for personal dashboards.
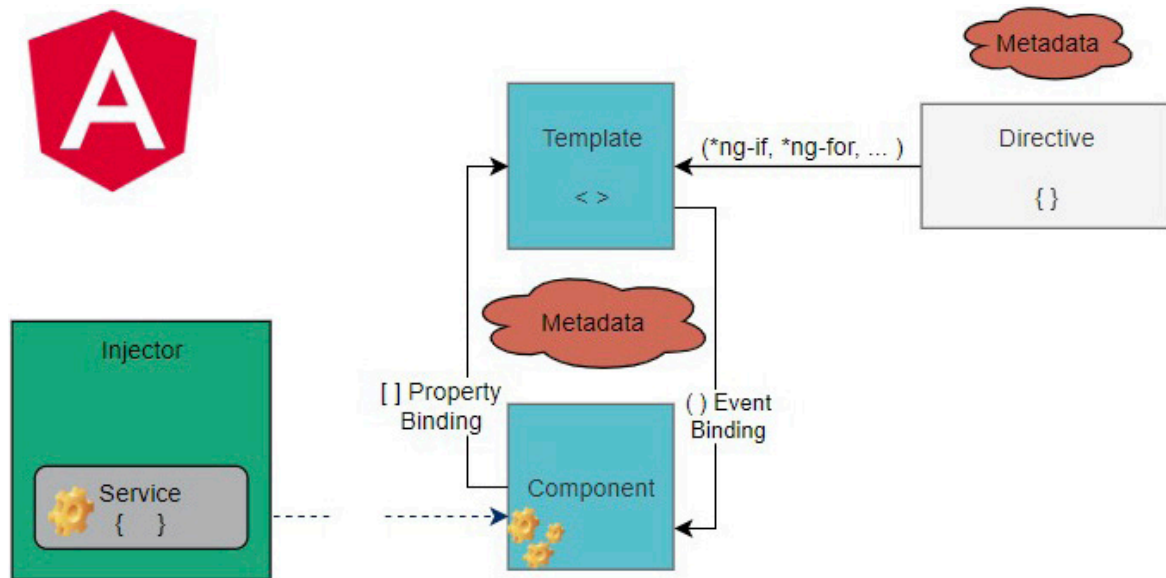
Figure 5 - Data workflow

Benefits & Impact

The term Smart City refers to the collective ideal of the city of the future. For the city of Málaga, a Smart City is an urban area in which – thanks to the use of digital technologies and more generally technological innovation such as FIWARE[7] – it is possible to optimise and improve services to citizens by making them more efficient:

- reducing energy consumption;
- optimising waste collection;
- improving public transport;
- reducing urban decay;
- **making better the urban experience of citizens**.

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[7] Since 2016, FIWARE and the city of Málaga have been working extensively together.. Recently, In 2020, FIWARE also attended physically to two fairs, TRANSFIERE and the 11th Forum of Urban Intelligence and Sustainability (GreenCities). Read the press release on fiware.org

The Smart Application developed by the city has currently 300 monthly users. Expected future users will be more than 5,000. The target group is related to people who need information about city mobility, however the target user group will broaden as the number of components gradually increases.

Added Value through FIWARE

The City of Málaga has been developing applications with FIWARE for more than two years. The concept of Context Broker which FIWARE provides as the center of the solution and its communication – offering the possibility of subscriptions – and the increasing number of FIWARE Ready components appearing on the market make. FIWARE an attractive, feasible and sustainable solution for the development of any city solutions. Thanks to FIWARE, this project has given to the city of Málaga several recognitions and awards:

- 2020 Best project award in transparency, openness, access to information and reuse. Personalized citizens dashboard. National Congress of Innovation in Services in Public Administrations (CNIS 2020);
- 2019 Winners of the Open Data Challenge at FIWARE Global Summit (Berlin, Germany) promoted by Connecting Europe Facility.

Next steps

In the next future, the final idea is to produce a version with as many different components as possible meeting the citizens' needs. The city of Málaga foresees the number of components to grow and to evolve as new components are made available regularly. The city is also preparing a component skeleton with an instruction manual for developers who may wish to create new components using open data or external data. For example, a developer may wish to create a component for cinema times, tv shows, airport arrivals/departures, train or bus timetables,

open pharmacies or sporting events. Any new component created by an external developer will firstly be evaluated before being included in the system. In addition, to motivate the development of those components, the city of Málaga intends to run hackathons specifically with this goal in mind.

References

- European Data Portal
- Personal Citizen Dashboard – Web page
- Personal Citizen Dashboard – Video

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Categories

Domains (s)	Smart Cities, Smart Tourism, open data, Smart Mobility
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