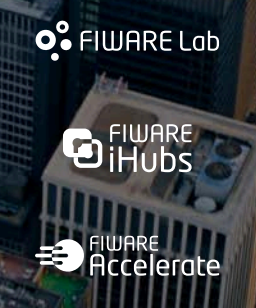


TRANSFORMING cities into engines of growth



fiware.org

FIWARE Lab

FIWARE iHUBs

FIWARE Accelerate

FIWARE Mondus

FIWARE Foundation

THE FIWARE Ecosystem



The FIWARE open source platform is becoming the "de facto" standard adopted by cities. It creates and integrates standards easing the development of smart applications in different sectors. FIWARE's open source nature allows platform providers to emerge faster in the market, activating the kind of competition and freedom of choice that are essential for innovation and growth.

Making a city "smart" means turning your city into an ICT enabler for innovation, economic growth and well-being. By adopting common standards and information models, cities can achieve this transformation with minimum impact, merging forces to build an ecosystem where they can connect and collaborate. This enables the creation of interoperable and portable solutions that can be adapted and replicated for the needs of each city, building a sustainable Digital Single Market for Smart Cities.

FIWARE is an open cloud-based platform for the creation and delivery of smart applications and services. It provides an open source toolkit of APIs (Application Programming Interfaces) and backend infrastructure components enabling app developers to create new portable & interoperable solutions for Smart Cities, quickly and cost-effectively.

The APIs offered by the components of FIWARE, known as FIWARE Generic Enablers (GEs), are public and royalty-free. Furthermore, the specifications of any FIWARE GE are backed by an open source reference implementation, thus accelerating existence of compliant platform products in the market. FIWARE GEs provide rich functionalities (connectivity to IoT, context and big data management, media processing, advanced UI support, business intelligence, web dashboards, etc), useful in many sectors: Smart Cities, Smart Agrifood, Smart Energy, Smart Industry...

But FIWARE isn't just about technology, it's a growing community engaging entrepreneurs, application developers, data providers, platform technology providers and entities that demand new applications based on the data they manage. Such is the case of Smart Cities, who can publish their data and combine it with others to facilitate the creation of applications built by developers that form part of this ecosystem. Building applications based on FIWARE is quick and easy for developers because they make use of pre-fabricated components and access to historic and real-time data provided by cities.

"FIWARE is open source, helping cities to avoid vendor lock-in and protect their investment."

FIWARE is the platform providing access to real-time open data describing what is going on in the city."

AN OPEN standard platform for Smart Cities

The first infrastructures deployed in Smart Cities have arrived linked to proprietary vertical solutions (mobility, traffic management...) and although they solve specific problems, they work as vertical silos. On the one hand, valuable data is not exchanged across verticals, preventing some innovative services to be developed. On the other hand, valuable data is not accessible in a common repository, hindering the development of cross-vertical city governance systems or the creation of applications and services by third parties using open real-time data.

Beyond vertical solutions, the challenge is to tear down these functional silos and integrate all the vertical systems into a horizontal platform for integrated city management, thus overcoming a fragmented model of sectorial applications working in watertight compartments without any connection with each other. The future is based on intelligence shared by all the agents in the ecosystem, whereby the city platform behaves as a facilitator of advanced governance systems and as the centre of an innovative ecosystem in which companies, particularly start-ups and SMEs, can faster materialize their ideas into applications/services, reach the market and make business.

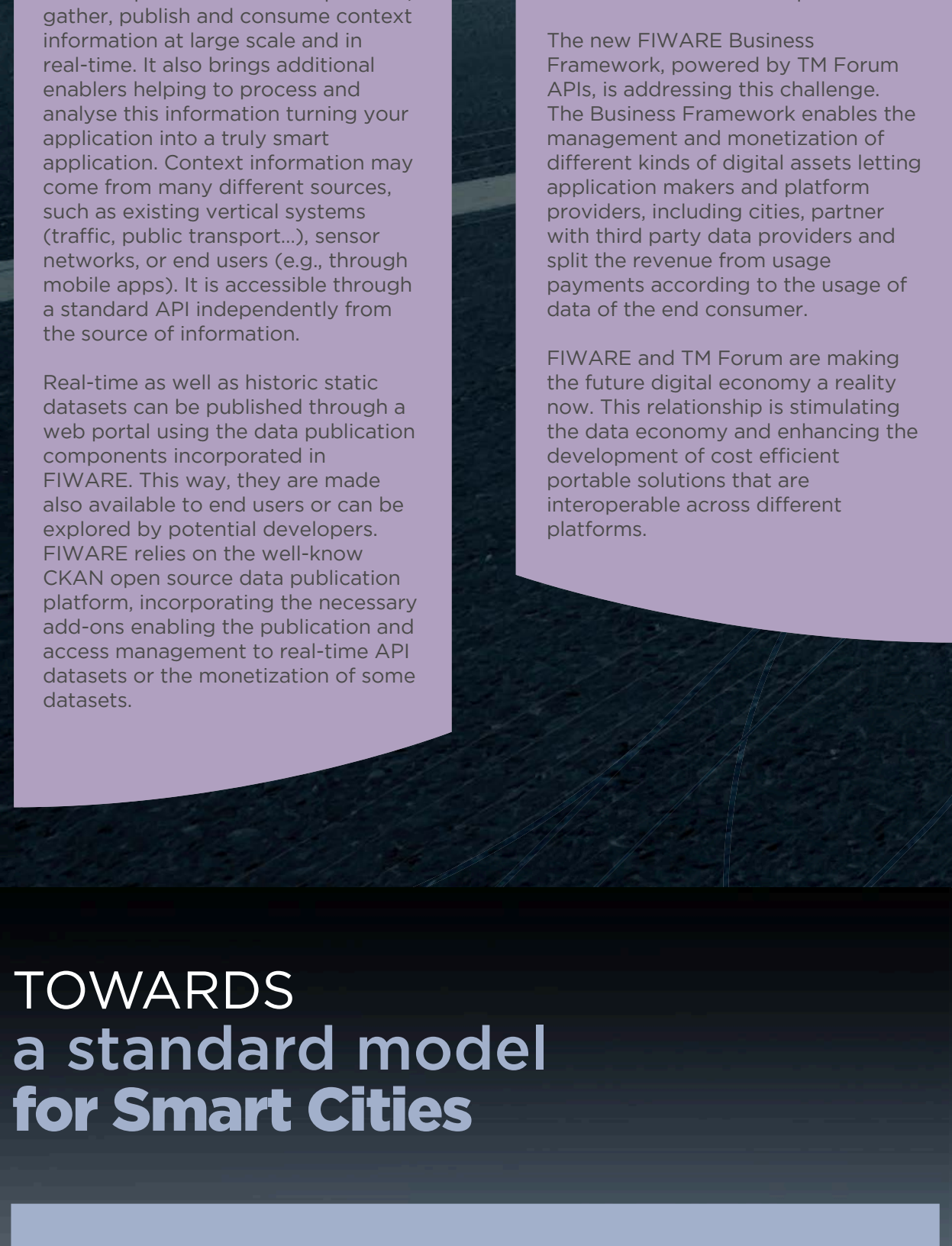
Thanks to FIWARE's open approach, both cities and entrepreneurs:

- Avoid getting locked-in to particular platform providers and can implement replaceable Smart City solutions.
- Can choose not only who will operate their applications but also who hosts their data.
- Can benefit a market for cities large enough to attract investment by a larger community of developers and entrepreneurs thus fostering innovation, economy growth and creation of jobs.
- Can develop and test Smart city applications in one city that can be ported and adapted to other cities, which means scale opportunities for developers and lower costs for cities.

Cities can connect their networks of sensors and data sources to the online FIWARE sandbox (FIWARE Lab). Developers can use this data and experiment with it, creating specific pilot applications with real time information. This way, FIWARE Lab becomes a meeting point for cities and entrepreneurs who can showcase their applications supporting a more efficient management of services or bringing new innovative services to citizens.

THE PLATFORM as the technological heart of the Smart City

A number of requirements for the platform architecture facilitates the growth of a sustainable ecosystem around it: being **standard, horizontal and scalable**



FIWARE - EFFICIENT MANAGEMENT OF CITY SERVICES

- ▶ Calculation of standard KPIs based on gathered data enables benchmarking of services.
- ▶ BigData analysis of historic context information helps to extract insights for a better management of services.
- ▶ Operational dashboards help to monitor services in real-time.
- ▶ Exchange of data between vertical systems enable more powerful services.

"FIWARE prepares your city for the future while capturing the first benefits today"

FIWARE - DEVELOPMENT OF SERVICES BY THIRD PARTIES

- ▶ Real-time open data become the fuel of innovative services for citizens and local businesses.
- ▶ The city can provide a trustworthy data marketplace involving third data and application providers.
- ▶ Third party applications are portable across cities.
- ▶ Innovative business models bring the necessary incentives to invest.

The Smart City AT THE DAWN of the data economy

Real-time context inform

The economy of data

Data describing what is going on in the cities is key for the development of smart city services. Actually, applications cannot implement a smart behaviour if they are not first context-aware. Data from vertical systems and sensor networks deployed in the city can be gathered and made available through common APIs exported by the city platform (working as a data hub) so that advanced governance systems developed by the city as well as innovative applications by third parties can run on top. This will unleash innovation, city efficiencies and new business models.

Partnering with FIWARE platform providers, smart cities can setup the infrastructure of a data marketplace enabling open innovation involving third data providers.

The classical approach to offer and consume open data has been focused on publication of static historic data, typically through direct files downloaded in well-known formats. Although this data is relevant and valuable for analysis and visualization and even for the development of certain applications, smart solutions require to have near real-time access to what is happening in the city at a given moment; the context of the city.

Open datasets published by cities can be exported in this marketplace and be made available to developers of smart applications. Third data providers can make a partnership arrangement with the city to include their data in the marketplace.

FIWARE provides means to produce, gather, publish and consume context information at large scale and in real-time. It also brings additional enablers helping to process and analyse this information turning your application into a truly smart application. Context information may come from many different sources, such as existing vertical systems (traffic, public transport...), sensor networks, or end users (e.g., through mobile apps). It is accessible through a standard API independently from the source of information.

Developers can create Smart Applications implementing revenue-share models with data providers, including the city itself. For example, end users can subscribe to apps that involve payment of a premium price for access to some of these sorts of specific datasets. In other cases, the app provider takes care of paying for access to the dataset because revenues come from other parties and not the end user.

Real-time as well as historic static datasets can be published through a web portal using the data publication components incorporated in FIWARE. This way, they are made also available to end users or can be explored by potential developers. FIWARE relies on the well-known CKAN open source data publication platform, incorporating the necessary add-ons enabling the publication and access management to real-time API datasets or the monetization of some datasets.

The new FIWARE Business Framework, powered by TM Forum APIs, is addressing this challenge. The Business Framework enables the management and monetization of different kinds of digital assets letting application makers and platform providers, including cities, partner with third party data providers and split the revenue from usage payments according to the usage of data of the end consumer.

FIWARE and TM Forum are making the future digital economy a reality now. This relationship is stimulating the data economy and enhancing the development of cost efficient portable solutions that are interoperable across different platforms.

TOWARDS a standard model for Smart Cities

The members of the FIWARE Open Industry Group - Telefonica, Orange, Engineering and Atos- first announced their commitment to create a FIWARE Open Source Community in 2015, aiming to support the evolution of standards for Smart Cities. Later, in 2016, the creation of the FIWARE Foundation has brought support to FIWARE activities by protecting the FIWARE brand, and preserving the principles of openness, transparency and meritocracy, which will work as the pillars of the FIWARE community.

This represents a significant step forward in the adoption of FIWARE as the de-facto platform for the development of IoT-enabled solutions and applications. It has also been a point of departure for a new digital era starting with the digitalization of three relevant business sectors: Smart City, Industry 4.0 and Smart Agrifood.

The Open and Agile Smart Cities is an international initiative led by the cities to boost the adoption of a shared set of mechanisms enabling development of applications that are interoperable between and within the cities. It allows the establishment of a public-private partnership context, incorporating providers of FIWARE platforms and developers. In addition, the applications can be ported across all the cities, thereby allowing the generation of a sustainable ecosystem where de facto global standards allow the reuse of solutions and the expansion of the potential market.

This commitment has also achieved an enthusiastic follow-up: 89 cities from nineteen countries in Europe, Latin America and Asia-Pacific have already joined in.

A new wave launch is now in preparation, with new cities and countries lined up. Are you a city representative? Would you like join in and drive your community growth and well-being?

Learn more about the OASC initiative at www.oascities.org

The Open & Agile Smart Cities Initiative

There are currently 89 cities from 19 countries in Europe, Latin America and Asia-Pacific who have officially joined the Open & Agile Smart Cities initiative.

- | | | |
|--|---|---|
| Australia:
Brisbane
Gold Coast
Springfield | England:
Bristol
Cambridgeshire
Leeds
Manchester
Milton Keynes | Netherlands:
Amersfoort
Amsterdam
Drechtsteden (In process)
Eindhoven
Enschede
Rotterdam
Utrecht |
| Austria:
Graz
Linz
Salzburg
Vienna | Finland:
Helsinki
Espoo
Vantaa
Tampere
Oulu
Turku | Poland:
Gdansk
Grudziadz |
| Belgium:
Antwerp
Brussels
Ghent
Leuven | France:
Saint-Quentin
Valenciennes
Amiens
Arras | Portugal:
Porto
Lisbon
Fundão
Palmela
Penela
Águeda |
| Bosnia and Herzegovina:
Mostar
Sarajevo
Tuzla | Ireland:
Dublin
Galway
Cork
Limerick | Scotland:
Aberdeen
Dundee
Edinburgh
Glasgow
Inverness
Perth
Stirling
Stirling |
| Brazil:
Olinda (Recife)
Anápolis (Goiás)
Porto Alegre (Rio Grande do Sul)
Vitória (Espírito Santo)
Colinas do Tocantins (Tocantins)
Rio das Ostras (Rio de Janeiro)
Taquaritinga (São Paulo) | Italy:
Genoa
Milan
Palermo
Lecce
Ancona
Cagliari
Terni
Messina | Croatia:
Dubrovnik
Sibenik
Split |
| Denmark:
Aarhus
Aalborg
Veje | Mexico:
Cuautla
León | Spain:
Valencia
Santander
Málaga
Sevilla
Sabadell
Guadalajara
Murcia
Las Palmas de Gran Canarias |

FUNDING for Smart City businesses

The FIWARE ecosystem aims to promote acceleration and funding programs for start-ups and SMEs launching new products and services for the city and industries. It ensures that SMEs can gain access to the technology platforms and Open Data necessary for the development of innovative applications and services. Linked to this Programme, the EU launched an ambitious campaign in September 2014 mobilizing up to 100M€, to support 1000 entrepreneurs, SMEs and start-ups in order to develop innovative applications based on FIWARE. Now, FIWARE seeks for the development of public or private programmes in other regions beyond Europe.

One of the principles of the OASC initiative is a Driven by Implementation approach where organisations, communities, as well as companies and entrepreneurs can profit from it.

The goal is for cities and developers to co-create their services, based on basic but commonly-defined APIs and data models; then being an active part of their curation and evolution within the definition of new data models and therefore also in the building of their own future business opportunities.

FIWARE key partnerships

FIWARE's participation in NITS GCTC'16 and International Working Group on IoT-Enabled Smart City Framework.

FIWARE's participation in the GCTC'2016 initiative has the main goal of showcasing the benefits coming from the adoption of common "de facto" standard technologies in and for Smart Cities. FIWARE aims at contributing to the definition of an open source reference architectural framework for smart cities that allows interoperability and portability of services and applications through different cities.

First instantiation of the 'Economy-of-Data' model via the TM Forum-FIWARE Business Framework.

FIWARE & TM Forum APIs helped to build an Open Source business framework which can work as the foundation for setting up dynamic marketplaces incorporating smart city and third party data based on which services from different partners can be developed, priced and monetized.

Collaborated with the European Data Portal to make open data available to developers.

The collaboration with FIWARE will help bringing the more than 250.000 datasets available on the European Data Portal even closer to the fingertips of the growing open community of thousands of FIWARE developers, startups and new users in Europe and world-wide. In the future the two initiatives will jointly consider ways to harvest the trend towards more real-time open data by using FIWARE de-facto standards.

"There is an opportunity to promote a shared vision and facilitate the exchange of information between cities, enterprises and industries, fuelling innovation in all kinds of daily-life processes. This way, cities will become major drivers of the digital transformation required for a sustainable economic development."