

SMART CITIES AND ENVIRONMENTAL SUSTAINABILITY

Sustainable living app welcomes new cities onto digital platform

With the contribution of

GREENAPES

FIWARE - OPEN APIs FOR OPEN MINDS

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Challenge & Context

Can individual actions and citizen choices really make a difference towards a sustainable future? The [European Green Deal](#)¹ and [Climate Pact](#)² speak clearly about the agenda and vision that the European Union passed on to governments and city administrations. The answer is yes.

Surveys and statistics on citizen-attitudes might appear reassuring. [Eurobarometer](#) in 2017 indicated that 94% of European citizens state that protecting the environment is important³. [Harvard Business Review](#) points out that in North America 65% of consumers state that “they want to buy purpose-driven brands that advocate sustainability”. Yet a small fraction of the population behaves consistently with such statements, following what is commonly referred to as the “value-action” gap. The result? We are far from achieving sustainable lifestyles, in spite of growing awareness and shared values.

But why is this happening? The short answer is: a lack of incentives. Often we face a trade off between what we feel would be the right thing to do (e.g. biking or choosing local/seasonal products) and what is most convenient (e.g. going by car or saving money).

Behavioural sciences are showing how our choices are influenced by many variables. A nice and immediate synthesis of our choice mechanisms is provided in the

¹ According to the European Commission “Climate change and environmental degradation are an existential threat to Europe and the world. To overcome these challenges, Europe needs a new growth strategy that will transform the Union into a modern, resource-efficient and competitive economy, where: there are no net emissions of greenhouse gases by 2050, economic growth is decoupled from resource use, no person and no place is left behind. The European Green Deal is our plan to make the EU’s economy sustainable”.

² The European Climate Pact is an EU-wide initiative inviting people, communities and organisations to participate in climate action and build a greener Europe. The Pact is an EU-wide initiative that invites people, communities and organisations to: Connect and share knowledge, Learn about climate change, Develop, implement and scale up solutions. As an open and inclusive initiative, the Pact will evolve and grow thanks to the creativity, needs and ideas of those becoming part of it.

³ European Commission, Special Eurobarometer 468 Report, Attitude of the European citizens towards environment, 2017.

international bestseller *Freakonomics*⁴: as humans we respond to moral, social and economic incentives. If these are not aligned, then the adoption of behaviours will hardly take place.

We should not be surprised then if, in spite of many campaigns and communication initiatives, cities and organizations are having a hard time engaging citizens to make sustainable choices. Costly campaigns addressing citizens are often scattered among different channels and players, which creates further dispersion. Short term (and limited) incentives have also been used, but their scope has rarely favoured a long-lasting cultural shift.

In order to achieve the sustainable development goals and meet climate targets, cities and regions need effective tools and approaches to engage their citizens.

Solution

[greenApes](#) was founded in 2012 with the mission to reinforce individual incentives for sustainable living via digital solutions. Now, the certified [Benefit Corporation](#)⁵, greenApes has developed a powerful and flexible platform shaped by pilots, innovative actions and successful projects with **cities, international organisations** and **research centers**.

Citizens can use greenApes as a way of rewarding their real-life actions (economic incentives), exchange ideas and best practices with fellow citizens (social incentives)

⁴ [Steven Levitt](#), [Stephen J. Dubner](#), *Freakonomics a rogue economist explores the hidden side of everything*, [William Morrow and Company](#), 2005.

⁵ greenApes is a Benefit Corporation which means a company that has the will to create good for the society and the environment strictly collaborating with the communities interacting with its products and services. Besides being a Benefit Corporation, according to Italian laws, greenApes is also a certified BCorp, Best of the World 2018 for the category Governance.

and join campaigns and challenges addressing specific environmental problems (moral incentives). Cities can channel which behaviours they want to incentivise as well as the rewarding policy.

Incentives are not an active cost for the administration as greenApes engages local businesses in the rewarding scheme. The results: by acting sustainably, citizens receive rewards and benefits, cities introduce incentives and support local consumption, and local responsible businesses receive visibility by providing rewards.

End-users can connect greenApes to local services (and locally used apps), and from that moment on receive points for their sustainable choices (e.g. the use of a bike sharing service). greenApes offers different technologies and approaches to “certify” behaviours of citizens, respecting the citizens’ privacy needs and preferences.

Between 2014 and 2018, greenApes was funded by three **FIWARE accelerators**: [frontierCities](#), [frontierCities2](#) and [INCENSE](#) contributing to the current success of the company.

Currently, **greenApes** can validate more than **20 kinds of sustainable actions** in the fields of **mobility, waste management, energy efficiency, local consumption, citizen participation**, volunteering and interacting with informative and educational content.

The system is built to aid easy integration with local services and apps, providing an engagement layer that combines informative campaigns, incentives and community building.

The solution was internally developed by the greenApes team, combining expertise in the fields of sustainability, ICT and communication integrating **the FIWARE technology, a curated framework of Open Source platform components to accelerate the development of smart solutions**. The service greatly benefitted from field cooperation with international research centers that partnered with greenApes in research & innovation actions, co-design sessions and impact assessments (e.g. Imperial College London, Fraunhofer Institute for Applied Information Technology, Wageningen University).

How it works

The greenApes app allows citizens to earn points for their real-life positive behaviours, to spend points to access rewards offered by local businesses, to have fun and learn (while earning extra points) for exchanging ideas and best practices with fellow citizens and for completing special challenges.

Overall, greenApes should be considered a platform composed of frontend applications, a backend application and an additional component dedicated to the interface with third party apps and services.

Frontend applications are the applications end-users (citizens) interact with. The apps are available for mobile devices (Android and iOS) and web browsers (www.greenapes.com).

These applications exchange data with the system using a set of REST services, which are exposed by the backend.

The backend services are provided by a microservice application which is deployed in various cloud services, to ensure scalability, reliability and availability.

An additional component (referred to as the goApes system, the one linked to mobility) allows the automatic accreditation of rewarding points to citizens, from activities that are performed via (paired) third-party services, like bike sharing providers, waste management apps or energy monitors. **FIWARE Generic Enablers (GE) are being used in this component.**

Orion⁶ is being used as the main responsible for passing events and messages across the other components of the platform.

⁶ Orion Context Broker allows you to manage the entire lifecycle of context information including updates, queries, registrations and subscriptions. It is an NGSLD server implementation to manage context information and its availability.

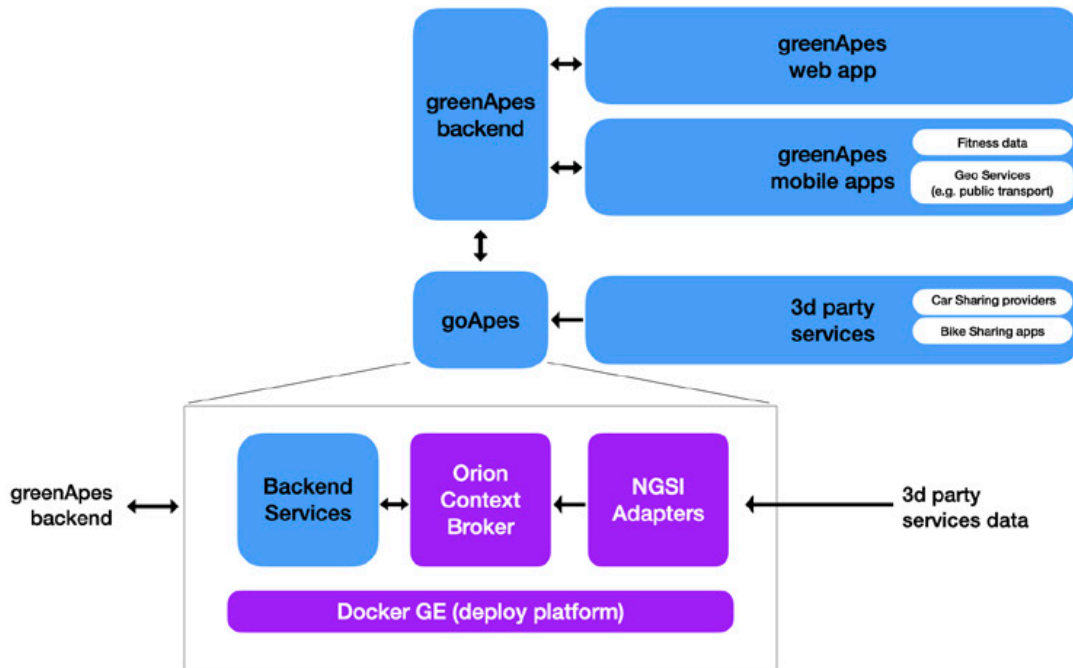


Figure 1 - Architecture

The **NGSI⁷ adapter** is being used together with the **Orion GE** as a framework to **write specific translation code for every third party proprietary protocol that needs to be integrated**. Currently, Orion GE and NGSI adapters are responsible for extracting data from external providers, which use proprietary APIs (such as bike sharing systems or 3rd party applications), and converting them into messages which can be routed to and consumed by other components of the system.

⁷ The current version of the specifications of the FIWARE NGSI API are the FIWARE NGSI-LD API specifications. In 2016, the European Commission published The 2016 Rolling Plan for ICT Standardisation in which it requested ETSI create a ISG (Industry Specification Group) aimed at definition of a standard Context Information Management API with FIWARE NGSI as candidate. ETSI created this dedicated ISG beginning of 2017 resulting in a new standard, NGSI-LD, in November 2018. This API specification is compatible with the FIWARE NGSIv2 API specifications supported by the FIWARE/CEF Context Broker, adding new features bringing support to Linked Data. More information about the cross-sector Context Information Management (CIM) ISG at ETSI can be found in the portal.

Proton GE is being used to detect anomalous patterns in data being fed by external services through Orion GE. Actually, for every external service integrated into the system, a set of rules and patterns are evaluated by Proton GE, which is also responsible for generating events and alarms. The information generated by the Proton GE analysis is then sent to the operation team, in order to verify if the anomalies detected could be configured as an improper use of the external providers. For instance, if two bike sharing rides were registered by a single user within an unreasonably limited time frame (eg. rides happening 10 minutes apart, in two different cities), Proton raises an alarm.

Benefits & Impact

The greenApes approach was first piloted in **Florence (Italy)** and **Essen (Germany)** in 2016-17. The context was provided by research projects and the results went far beyond expectations: 72% of participants stated that the use of the platform made them adopt new sustainable behaviors, while 65% reported they had discovered new sustainable local businesses and initiatives.

In 2018 (in cooperation with service design agency NEU), **greenApes won the tender of the city of Milan (Italy)**, which was looking for a “Digital Social Market” for engaging citizens during its “Sharing Cities” project. The scope of the tender was to test an Android app for incentivising sustainable living in a district of the city (Porta Romana Vettabbia). greenApes **enabled** (for a reduced price) **to engage citizens** not only on Android but also iOS and web apps, reaching out to higher segments of the population. The project engaged more than **2,000 citizens**, who shared a total of **6,000 best practices and claimed more than 70 rewards for their actions**. [Imperial College London](#) is currently performing a study on the correlation between the platform use and actual indications of behaviour change.

In 2019 and 2020, greenApes expanded the amount of integrations with third party apps and services, was picked to support several Corporate Social

Responsibility projects (CSR), enabled sustainability projects in the **Province of Siena, Italy** (with playful competitions between schools and classes) and started powering a project on sustainable diets incentivising healthy and sustainable meals in corporate and university canteens in partnership with the [Barilla Center for Food and Nutrition, Wageningen University \(NL\)](#) and [The Sustainable Restaurants Association \(UK\)](#). In parallel (for the [GOEASY Horizon 2020](#) project in partnership with, among others [LINKS foundation](#), [Fraunhofer Institute for Applied Information Technology](#) and [City of Turin](#)), greenApes developed [GoPongo](#), a new mobility app for tracking and mapping mobility choices of citizens, perfectly anonymous with privacy friendly tracking and rich data for decision makers. The solution is being piloted in several organizations of Turin, to support home-to-work mobility planning.

In 2020, greenApes also onboarded new shareholders, receiving investments from [seveng](#), a rapidly growing energy service company. greenApes over the years positioned itself as an innovative and inclusive sustainability platform for citizen engagement projects, with vertical technologies allowing action certification, self-sustainable incentive mechanisms (linked to the local economy) and community building capacities.

The company has received several acknowledgments:

- **2014**
Italian Sustainable Development Award (with Medal from the President of Republic).
- **2016**
Finalist at Italy's Gamification Awards for Consumer Engagement.
- **2017**
International Finalists at Katerva Awards in the Behaviour Change category.
- **2018**
Philips Smart Cities Challenge in partnership with FLOUD.eu.
- **2018/2019**
Best for the World Honouree, among global B Corps (categories: Governance, Change-makers).

Added Value through FIWARE

greenApes started introducing FIWARE technologies in 2016. Given the company's founding mission of openness and positive impact, FIWARE proved to be the right environment in which to develop tools and solutions that can support smart cities and regions.

The choice was also influenced by the importance that FIWARE placed on IoT and data brokerage, with FIWARE enablers being built to facilitate plug&play solutions and API integrations.

FIWARE's generic enablers were the natural candidates for the development of the interface layer in between greenApes backend and third party apps and platforms that greenApes can connect to (in order to reward sustainable behaviors of citizens). This is how the technology was implemented (and is currently used), as illustrated in the architectural diagram shown above.

The choice paid back both in terms of reliability and market positioning. By **introducing FIWARE building blocks, greenApes immediately showed the importance it attributes to transparency in the management of citizen data.** At the same time the development team can **count on the continuous improvements and evolutions provided by the FIWARE community of developers.** Finally, FIWARE enablers are developed and evolved keeping a strong focus on use-cases for smart cities: exactly what greenApes needs to expand its network of connections and integrations.

Next Steps

greenApes is due to be launched in further 3 Italian cities: **Parma**, **Siena** and **Prato** in early 2021.

Meanwhile, the company will start deploying its new mobility app to assist mobility managers and decision makers in the mapping of intermodality and home-work commuting habits.

A new app to monitor energy savings (in connection with Energy Management Systems) will be deployed in medium and large companies, with the option of tracking CO2 savings and the opportunity to reward employees that contributed to the achievement of such goals.

The greenApes main app (which is always connected to the mentioned “satellite apps”) is also undergoing a visual redesign, with a completely renewed version of the app expected for spring-summer 2021.

References

- [Eurobarometer](#)
- [Katherine White, David J. Hardisty, and Rishad Habib, *The Elusive Green Consumer*, Harvard Business Review, 2019](#)
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