



EHEALTH AND SMART CITIES

# Key Ref, cloud solution for management of school services

With the contribution of

**KNOWIGE**

**FIWARE - OPEN APIs FOR OPEN MINDS**

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## Challenge & Context

Each school is a complex ecosystem in and around which different services are developed in addition to the educational one: public transportation, the canteen, booking, or registration services.

The canteen service chain alone involves several stakeholders: the child who eats the meal, the parent who books the meal and pays for the service, the dietician who establishes the food regime, the municipality that chooses the quality level of the products, and the restaurant company that buys raw materials, produces and distributes the meal.

These stakeholders need to be properly coordinated to ensure great quality service, full user satisfaction, and stay within the budgets foreseen.

In a city of e.g. 50,000 inhabitants, on average, 3,000 children have lunch at school every day, and the management of the whole process, from the booking to the distribution of the meal, must be concluded in less than 5 hours. The certainty of the information and the punctuality of the data are a decisive factor for effective service management.

## Solution

KEY REF platform was born in 2009, with the aim of creating a Cloud solution that could manage the chain of **collective catering in the school canteens of an Italian city**, simplifying the work of all the actors, from the production of the meal to the payment of the service, as well as checking the quality of what the children eat.

The platform allows the various actors to carry out their activities in a coordinated way, maintaining visibility over the entire process chain:

- Municipality checks members and tracks payments;
- Doctor/dietician checks the food offered;

- Restaurant company schedules the food preparation and delivery;
- Parent books the meal, checks the status of the service;
- Inspectors check the entire process.

Data used by the platform, therefore, naturally comes from different sources:

- smartphone that the parent uses to book the meal;
- production systems that collect data during the preparation of the meal;
- waste collection systems (during the disposal of dishes);
- payment systems for services;
- and often even further systems.

KEY REF, over time, has allowed for not only the optimization of the process but also the value enhancement of **being able to analyse, aggregate, compare, correlate and discover the eating habits of children**, thereby gaining a better understanding of how to improve them. Over the years, the solution grew, supporting also other services linked to schools, such as **transport services** (optimising the management of bus lines) and the **nursery** (managing enrollments and rankings, with adjoining breakfast and canteen services).

KEY REF has evolved greatly over time, and today, it is a software platform based on Open Source technology, which **additionally allows the Municipality to equip itself with a centralised system of payments, collections, and the management of a single registry of citizens**.

KEY REF allows the activation of **services on individual demand** for the management of **school canteens, public transport, and nursery schools**. The system allows complete management of the service flow. **It allows the institution to associate each pupil with a specific service or multiple services**. Each pupil has a unique card, which is used by the parent to top up the service at the affiliated centres. This card allows its user **to book canteen services and reports the services in a timely and uniform manner, providing notifications to the citizen via text message**.

**Citizens can make micro-payments for the service at each recharge point,** and access information and details of the service via the web portal from a PC or

smartphone. In fact, KEY REF enables the management and reporting of every phase of the canteen service process, both via web and mobile.

KEY REF is AGID compliant and is **fully integrated** with European **accessibility standards**. It allows authentication via SPID (digital identity)<sup>1</sup>, payments via PAGOPA app<sup>2</sup>, and notifications through APP-IO app<sup>3</sup>.

## How it works

KEY REF is developed with a full Open Source stack. It is composed by SugarCRM<sup>4</sup>, joined with Liferay<sup>5</sup> and MySQL<sup>6</sup>. The CRM<sup>7</sup> is also connected with IoT agents that provide data on meal production and waste. KEY REF is available via app and web browser, and it uses [KNOWAGE](#)<sup>8</sup>, a **FIWARE-ready Enabler**, as the data visualization layer.

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<sup>1</sup> SPID is the Italian Public Digital Identity System that identifies citizens securely and allows them to access all public services online.

<sup>2</sup> pagoPA is the Italian digital platform that allows you to make payments to the public administration and beyond in a transparent and intuitive manner.

<sup>3</sup> The IO app is the outcome of an Open Source project created with the aim of providing organisations and citizens with a single channel from which to use all digital public services, as a pillar of the Italian government's strategy for digital citizenship.

<sup>4</sup> SugarCRM's functionality includes sales-force automation, marketing campaigns, customer support, collaboration, Mobile CRM, Social CRM and reporting.

<sup>5</sup> Liferay, Inc., is an Open Source company that provides free documentation and paid professional service to users of its software.

<sup>6</sup> MySQL is an Open Source relational database management system. Its name is a combination of "My", the name of co-founder Michael Widenius's daughter, and "SQL", the abbreviation for Structured Query Language.

<sup>7</sup> Customer relationship management is a process in which a business or organization administers its interactions with customers, typically using data analysis to study large amounts of information.

<sup>8</sup> KNOWAGE is an open Source analytics and business intelligence suite. It satisfies traditional requirements as well as innovative and challenging informative domains. It is based on an open source model, perfectly combining the innovation coming from the communities with the experience and practices of the enterprise-level solutions. KNOWAGE allows to combine traditional data and big data sources into valuable and meaningful information. A full set of features, such as data exploration, data preparation, self-service data, ad-hoc reporting, mash-up, data/text mining embedding and advanced data visualization, give special focus on big data / cloud data sources and augmented analytics.

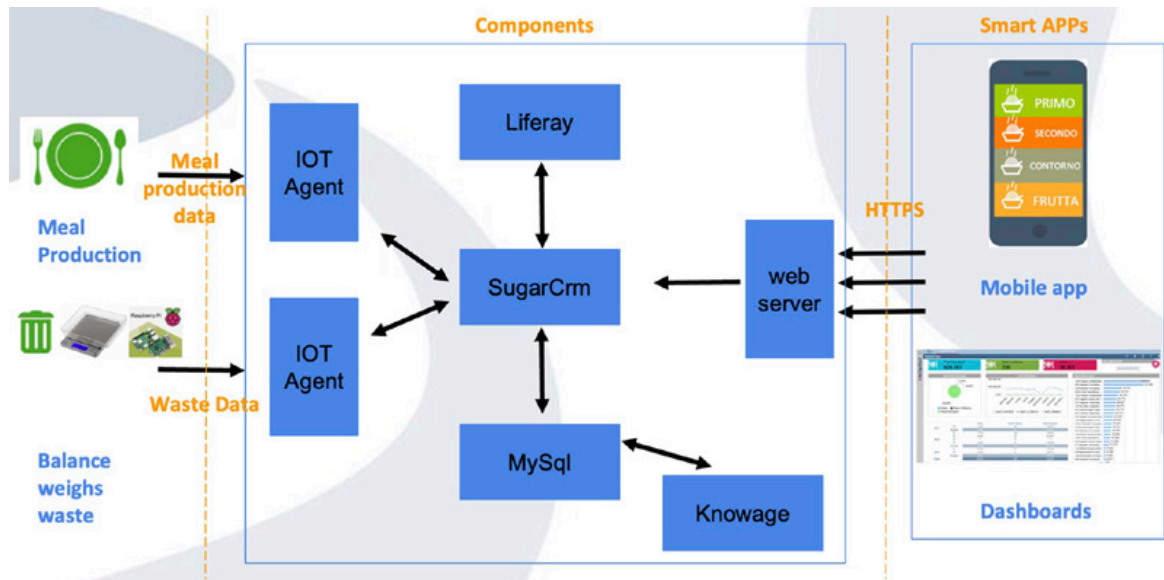


Figure 1 - Architecture

**KNOWAGE, an Open Source solution, is one of the solutions available within the [FIWARE Marketplace](#) to add analytical and business intelligence capabilities to other solutions.**

**KNOWAGE** allows users to gather all data in single **interactive views**, allowing **every stakeholder** to access the **full set of information**.

More in detail, **KNOWAGE** provides three different dashboards to monitor meals, raw materials, and health and cultural integration.

**Produced and distributed meals** — enhances and simplifies the visualization of data, and gives each user their own point of view on the data, using the dashboards to give, at a glance, the production and distribution of meals, with their series history.

**The raw materials used** — this dashboard allows the reading of information, even in real-time, simpler and more intuitive, aggregating them in different dimensions, for example, the raw materials used for production.

**Health and cultural integration** — the visualization of the data, and the possibility of aggregation by categories not used by the users and correlating with unusual information, has enabled process control and the discovery of the children's eating habits. This has resulted in some confirmations and surprises that have been helpful in improving the nutrition education of children.

## Benefits & Impact

KEY REF provides a management advantage for the institution and social advantage for the citizen.

### Management Benefits

- advance of receipts
- recovery of arrears
- elimination of paper
- reduction of management times
- monitoring of the supplier (in case of outsourcing of the canteen service)

### Social Benefits

- greater accessibility to payment for the service (in terms of multi-channeling and micro-payment)
- greater transparency of the service
- higher quality of work for the staff in charge of the service

Today, KNOWAGE represents the added value of the KEY REF solution because it has transformed the simple management product into a data enhancement tool, also allowing us to design new services, precisely by observing the data that the service produces.

The FIWARE ecosystem proved to be a great support for KEY REF development, not only for the addition of analytical and data visualisation capabilities brought



by KNOWAGE but also for providing a broad network of skills and experiences supporting OSMOSIT to develop the solution to its maximum potential and open new sales channels.

## Added value through FIWARE

FIWARE allows KEY REF to gain data analysis and data visualization capability through KNOWAGE, available in the FIWARE Marketplace as a FIWARE-ready Enabler.

The broad network of companies and organizations around the FIWARE ecosystem supported the technological experiences and commercial relations that led to KEY REF's creation and spread.

KEY REF has been showcased e.g., during the FIWARE Global Summit in Genoa (Italy) in 2019, or during the Italian event “Open Opportunity, Presenta la tua impresa” of Assintel (the Italian National Associations of ICT enterprises).

KNOWAGE's evolution has been showcased to the FIWARE community at each FIWARE GlobalSummit from 2017 to 2020. In the same years, KNOWAGE Labs helped various companies willing to use FIWARE solutions to make developments and integrate KNOWAGE with other FIWARE technologies.

## Next steps

KEY REF is furthermore evolving as a tool for measuring services, and therefore the liveability of the city. It is strengthening the data-driven approach, integrating more and more information to enrich its data lake and anticipate the social needs/welfare of a city — and above all to meet growing targets of citizens (families and children).

## References

- [FIWARE Global Summit — Keyref: Using Data Analytics for Food Delivery in Collective Catering.](#)
- [Osmosit — CRM - Gestione Servizi Scolastici](#)



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## Categories

**Domains (s)** eHealth, Smart Cities, Smart Mobility

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