ITEA 3

Project Results

SEAS

Smart API and appstore thanks to SEAS

EXECUTIVE SUMMARY

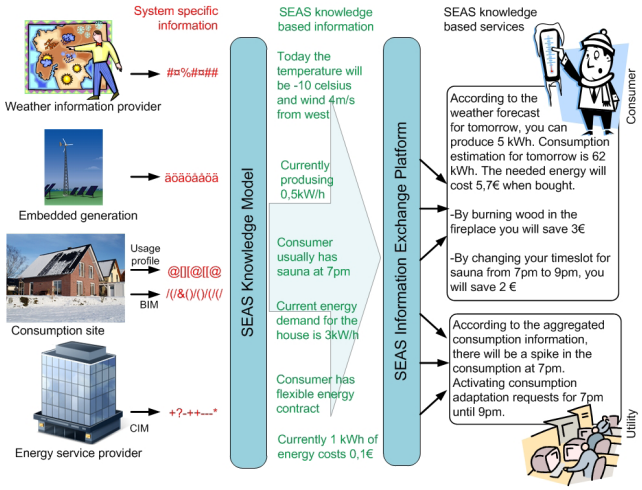
What if a data-exchange language allows all electrical production and consumption systems to communicate with each other in real time, from machine to machine, a universal language that ensures trust, security and privacy? This is the SEAS revolution. More cost-effective, more green-friendly and more customer focused with streamlined electrical production and consumption...everywhere.

PROJECT ORIGINS

Structural solutions enable critical mass of future resources. This can create working markets with interoperable information and a framework validated by demonstrations that show sample ontologies able to model different levels of the Energy domain. The SEAS challenge lies at the heart of energy transition. It set out to enable interworking of energy, ICT and automation systems at consumption sites, introducing dynamic and intricate ICT-based solutions to control, monitor and estimate energy consumption. It also explored business models and solutions to enable energy market participants to incorporate micro-grid environments and active customers. The outcome is a unique, future-proof open architecture that is characterised by interoperability, innovation and different kinds of business models based on an advanced dynamic ontology dedicated to the smart energy grid.

TECHNOLOGY APPLIED

The ITEA 2 project SEAS built a Knowledge Model to address the unlocking of silos, using knowledge of innovative concepts like semantic modeling to create a sustainable and open concept. The semantic model serves as the definition of the Smart Energy API Standard, a means for energy IT systems to connect to each other intelligently and transparently to users. System manufacturers, IT integrators and the like can take this technology into use with the open source Smart API software development kit (SDK) and design their systems to be compatible with the Smart API Services that orchestrate connections and serve as a design reference.



From Service Ontologies and Knowledge Model to SEAS Reference Architecture

The scope and breadth of the project is evident from 120 use cases classified in six main categories along with 30 ontologies for the energy domain. In addition to two demonstrator scenarios defined on autonomous building and micro grids, 16 pilots in four different countries and distributed data platforms were installed, supplemented with a Microgrid Context Awareness Framework, including algorithms, and demonstrated on a dataset of 40 houses (2125 measuring points) and four billion data entries plus a Last Mile Data Acquisition Hybrid Network. A simulation tool helped the partners simulate the behavior of their services before implementation.

MAKING THE DIFFERENCE

The idea behind the Smart API is automatic configuration between systems and services, enabled by the semantic definitions of systems. This makes it possible to take new energy services into use and make mashups of them just as you would install apps on your smartphone: just browse a directory and click to integrate.

One of the early adopters of this technology is the Data Access Point Manager (DAPM) developed within the SEAS project and already making waves both within ENGIE (French project leader) and among early city adopters. Aubagne in the south of France responded to this new “City as a Service” model whereby the SEAS model lies at the heart of new urban ecosystem concept. Data

management operates on a horizontal level across domains – transport, water, heating, lighting, even weather information and traffic regulation, bringing urban management to a higher level. With open access and reuse of technology bricks central to the SEAS platform approach, cities can even benefit from proven initiatives taken elsewhere, with a city in one country 'cherry-picking' the best of the innovation from a city in another country and so on, in a virtuous circle. SEAS therefore becomes not only an enabler of innovation but also a "business connector", promoting the digital transformation of smart cities, back up with a public repository in W3C and aligned with M2M, ETSI & AIOTI standards.

Consortium member CNR has tackled the question of how to synchronise periods of electricity consumption with intermittent production from renewable energy sources and is experimenting with a smart management solution for charging the electric vehicles of its fleet and those of the technical services of its partner, Grand Lyon Metropole. GECAD, the Research Group on Intelligent Engineering and Computing for Advanced Innovation and Development at Porto Polytechnic, has developed a hybrid software and hardware simulation platform to simulate scenarios composed by physical devices (consumption and PV generation), located in real buildings and complemented by software agents able to represent multiple entities (consumers, generators, electric vehicles, microgrids, buildings, etc.). Télecom Bretagne (Institut Mines-Télécom) has produced a dynamic and fast solution, able to adapt to real production, based on machine learning, that provides the energy management distribution system operator with a tool to generate an hourly-based PV production estimation (the interval depending on the weather forecast interval).

Asema IoT Central is a software that embeds the full functionality of the Smart API into a development platform that can be used by organizations who want to implement their own energy and mobility IoT solutions.

The Smart API SDK and the specification is maintained by the consortium member Asema Electronics. Parties interested in becoming a part of the energy network can download the free software from www.smart-api.io and acquire support in software integration from Asema Electronics.

In terms of revenues, exploitation short-term (2017) is expected to be €2 million, with medium-term exploitation (2018) anticipated to be €25 million and long-term revenues (2019 to 2021) as much as €600 million.

MAJOR PROJECT OUTCOMES

Dissemination

- Defining a Distributed Architecture for Smart Energy Aware Systems, Guillaume Habault, Jani Hursti, Jean-Marie Bonnin
- CSD&M 2016 in Dec 2016, Guillaume Habault

Exploitation (so far)

- SmartAPI Reference Architecture Model (S-RAM), a design reference for manufacturers; shows how to plug their products into a global network in a way that enables coordination and control
- Smart Energy API Standard (SEAS), a data definition for software engineering on how energy systems should communicate
- SmartAPI Software Development Kit (SDK), an open source software development toolkit to easily engineer compatible systems
- Asema S series relays. Measure and control actual physical devices, make the actual changes to the network, accessible through SEAS standard
- Asema M series power meters. IoT power measurement units accessible through SEAS standard
- Asema E series gateways, for edge i.e. in field level semantic connectivity; connect physical devices into the network
- Engie DAPM data hub, for cloud i.e. network level connectivity to connect third party IT systems and algorithms
- Empower EMS management system. Energy domain network orchestration system to balance the network
- BeNomad route planner. Converts kilometers to kilowatts, calculates the power consumption of an electric vehicle on real routes.

ITEA is a transnational and industry-driven R&D&I programme in the domain of software innovation. ITEA is a EUREKA Cluster programme, enabling a global and knowledgeable community of large industry, SMEs, start-ups, academia and customer organisations, to collaborate in funded projects that turn innovative ideas into new businesses, jobs, economic growth and benefits for society.

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Turkey
Defne
Enerjisa Baskent Elektrik
Innova IT Solutions Inc
LNL Elektrik Elektronik Bilisim ve Danismanlik Ltd. Sti.
SimBT Inc.

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February 2014

Project end
December 2016

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