



## Project Results

# BaaS

“Building as a Service” as technical enabler for future building automation ecosystems

### EXECUTIVE SUMMARY

The main objective of the ITEA 2 project BaaS was to come up with a novel approach to digitalisation in building automation systems. By specifying the BaaS Information Model, rich semantics and a domain-specific language were created to model data, functions and services along with the BaaS Service Platform that employs model-based tools and a service-oriented architecture for easy integration and extendibility. A key outcome of the project is the publicly available BaaS Reference Architecture that documents its essential concepts.

### PROJECT ORIGINS

Future smart buildings need comprehensive and extendible cross-domain management and control functionality that today's building automation and management systems do not adequately provide. These buildings should not only create an environment that optimises the conditions in which people can work and live in comfort and with security but should also ensure that management and maintenance are performed effectively and efficiently. The BaaS project set out to tackle these challenges by introducing a novel semantic IoT service framework for commercial buildings along with a reference architecture and corresponding software platform as a basis for current and future commercial building automation and management technologies.

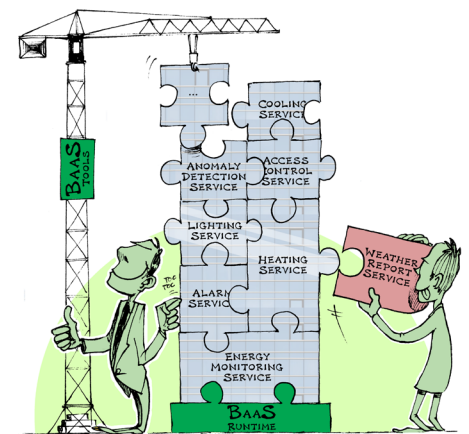
### TECHNOLOGY APPLIED

The BaaS Reference Architecture provides common concepts and guidance for the development of concrete BaaS platforms. In particular, the BaaS Information Model facilitates the semantic modelling of devices, functions and data and thus provides a blueprint for the specification and generation of BaaS services. The reference architecture describes a set of so-called ‘views’: Lifecycle (the activities in the different phases of the BaaS lifecycle and the transitions from one phase to another); Information (the

information model supporting the semantic specification of data points and services); *Functional* (the functional building blocks, its responsibilities and its relationships among each other) and Behavioural (the interaction and communication patterns between BaaS services). Qualitative requirements are addressed by so-called ‘perspectives’: Security, Dependability, Technical Management. The establishment of a BaaS system follows a service lifecycle model that covers the six phases Design, Development, Engineering, Commissioning, Operation and Optimisation. The BaaS platform provides a number of tools and methodologies that support the first four phases of the service lifecycle while the BaaS runtime provides the capabilities needed to operate a system of BaaS services. A technical management system monitors the services and ensures their proper operation.

### MAKING THE DIFFERENCE

The benefits of the BaaS platform and runtime have been shown in various application demos, including an Emergency Evacuation demonstrator and a Smart Workplace demonstrator. Building automation engineers benefit from BaaS tools that facilitate easy and flexible modelling, development, engineering and commissioning of services while tenants benefit from enhanced comfort, better customisation of services and energy savings



through presence detection and environment awareness. Essentially, the BaaS approach can serve as a blueprint for stakeholders in future building automation services ecosystems.

Among the Turkish consortium partners, Defne has coupled its core products including Alarm Management to the BaaS infrastructure with the aim of gaining a competitive advantage in penetrating the BAS market and building creative services in collaboration with BAS vendors or integrators. Bor announced its first commercial product from BaaS, BEY – Building Inventory Management, which involves, among other things, the commissioning, operation and monitoring of BAS as well as digital and

non-digital inventory management. KocSistem is integrating its dynamic content broadcast Pixage application with the BaaS platform to create specific solutions and integrate with other BAS services as an extra advantage and feature of the Pixage product.

The German partner Materna, a leading German ITC consulting company, is using a successfully run BaaS pilot with one of its customers as a catalyst to make BAS management part of its ITSM portfolio thereby strengthening customer loyalty and adding another service business. Siemens, a leading building automation solution provider, is part of the Fairhair Alliance that brings leaders in the lighting, building automation and IT industries together to provide guidance for the advancement of mainstream building automation technologies and facilitates the transition of lighting and building automation ecosystems to an IoT technology stack. Concepts from BaaS are used to specify an information model, semantic tagging and a semantic discovery mechanism for Fairhair. Moreover, selected BaaS results are fed into pre-product R&D activities within Siemens. TWT exploits the developed semantic framework from the BaaS Information model to

establish a so-called Smart Data Hub, a generic interface for individualised user queries to various data sources that will eventually connect enterprise applications with underlying data management systems.

From the Spanish Consortium, everis aims to integrate BaaS Solution with the everiSmart – global and multi-sector initiative – service catalogue related to Urbanism and Intelligent Buildings Services while Prodevelop, an SME leader in ICT port solutions, has used BAS added-value services to enhance its POSIDONIA Space © (Smart maintenance of harbour infrastructures) and POSIDONIA Safety © (Emergency plan specification and execution based on outdoor and indoor location systems) solutions. Finally, the Czech SMEs, MDS and X-COM, are integrating BaaS gateways into their existing product line and gaining a new business perspective in the area of computer rooms and other shared technology rooms.

While more time is still required for the exploitation potential of BaaS technologies to mature, the examples above reveal that this potential is already being utilised and that more prospects of doing so are in the pipeline.

## MAJOR PROJECT OUTCOMES

### Dissemination

- 42 publications (workshop, conference and journal papers)
- Co-organisers of IEEE SOCNE/EFTA 2014, 2015 and 2016 Conferences, of IT4Energy Workshops 2014 and 2015 and of Smart Space Orchestration Workshops (S2O) Spring and Autumn 2014 (incl. ‘Technology Hands-on’)
- Project demonstrations at conference exhibitions and fairs (a.o. EUREKA Innovation Week 2016, CeBIT 2016, SOCNE/EFTA 2016)

### Exploitation (so far)

- **New products:**
  - BEY – Building Inventory Management of BOR Software
  - Enhancements of Prodevelop’s POSIDONIA Space © and POSIDONIA Safety © solutions
  - Enhancements of KocSistem’s Pixage product
- **New services:**
  - Extension of everiSmart Urbanisation and Intelligent Building Service Catalogue
  - Extension of the Materna IT Service management portfolio by services for Building Automation
- **New systems:**
  - Provision of a semantics-based IoT technology stack and a semantics-driven engineering mechanism for Siemens Building Technologies
  - Contributions to the launch of the TWT Smart Data Hub

### Standardisation

- Contributions regarding information model, semantic tagging and semantic-driven discovery to the Fairhair Alliance Technical WG

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## BaaS

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### Partners

#### *Czech Republic*

Masaryk University Institute of  
Computer Science  
MDS Computer s.r.o.  
X-COM BASE Praha

#### *Germany*

Fraunhofer Gesellschaft E.V.  
Kieback&Peter GmbH & Co KG  
Materna GmbH  
Siemens AG  
TU Dortmund  
TWT GmbH Science & Innovation  
University of Rostock  
Technical University of Munich

#### *Spain*

Everis  
Prodevelop

#### *Turkey*

Bor Software inc.  
Defne Telekomunikasyon A.S.  
Kartek Kart ve Bilisim Teknolojileri Tic.  
A.S. SmartSoft  
KoçSistem Information  
Communications Services

### Project start

November 2013

### Project end

November 2016

### Project leader

Franz-Josef Stewing, Materna GmbH

### Project email

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### Project website

<http://baas-itea2.eu/cms/>