ITEA 4

Project Results

COSIBAS

Cognitive services combining AI and IoT

Using FIWARE as a reference architecture, the ITEA project COSIBAS (Cognitive Services for IoT-based Scenarios) will combine Internet of Things (IoT) and Artificial Intelligence (AI) through a set of cognitive components that enable straightforward interoperability and integration for both legacy systems and emerging technologies.

Project origins

IoT and AI have the potential for digital transformation in countless industries, yet the current focus lies too heavily on data handling. This has come at the expense of data interpretation, interoperability with legacy systems and IoT architectures which enable intelligent applications, all of which could generate business value in terms of faster analysis and improved decision-making. The combination of IoT environments with cognitive AI services is therefore an important next step.

COSIBAS has built an abstraction layer between existing platforms for IoT and AI technologies to enable cognitive solutions and increase interoperability across multiple domains. The basis for this is FIWARE, an open-source initiative facilitating the development of solutions in domains such as smart industry and smart energy. The resulting low-cost transversal platform supports scalability and the evolution of largescale heterogenous systems and allows legacy infrastructures to be modernised with cognitive tools and communication mechanisms while reutilising assets.

Technology applied

Technologically, the project offers a three-fold solution: COSIBAS as a general platform, COSIBAS as a smart grid solution and COSIBAS as a sea traffic management solution. The former is an extended FIWARE-based platform with a cognitive enabler framework composed of a cognitive broker (a transversal component managing all communications between cognitive components and FIWARE) and cognitive agents that provide different AI algorithms depending on the application domain. By integrating new and existing AI-based features into FIWARE without the need to start from scratch, COSIBAS opens up the option to add cognitive assets which are currently missing from FIWARE and thereby provide access to it in new domains.

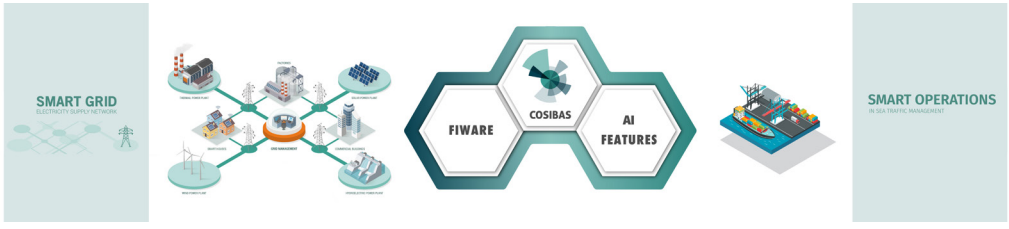
For smart grids, COSIBAS offers different technologies and AI-based features in order to provide a modular, extensible solution which addresses flexible and emerging energy markets like peer-to-peer (P2P) energy trading. These technologies (which include energy prediction algorithms, negotiation algorithms, an energy trading platform and a smart data visualisation system) will help with collective self-consumption management support, flexibility, intelligence and cost optimisation.

The solution for sea traffic management, meanwhile, offers a modular FIWARE-based solution able to manage multiple data sources (like historical AIS data and marine climate data) and provide more reliable and accurate estimated time of arrival (ETA) estimations in order to optimise port-related logistic activities. COSIBAS has enhanced the legacy system Posidonia with new AI-based features like ETA prediction algorithms and has optimised the timing and efforts of vessel operations, thereby creating more efficient and economic port services.

Making the difference

Regarding results, the project has achieved its goals of enhancing the FIWARE platform with cognitive components that bring intelligence to both legacy systems and new business applications. From a starting point of zero, 11 cognitive components have been integrated into the COSIBAS platform.

The use-cases have also seen excellent outcomes: the smart grid prediction algorithms were created from scratch and have reached a precision rate of 92%, while the error rate for ETA calculation in sea traffic management has been reduced from 14.5% to 2%. The latter is particularly significant given that 30% of global shipping port stopovers



COSIBAS overview

have around 24 hours of delay. By reducing margins of error by 13 minutes, COSIBAS-enhanced Posidonia could save ports up to EUR 400,000 per year.

As a selling model, COSIBAS will be installed and integrated as a platform instance in customer premises. The project's main market impact is aimed at addressing the needs of SMEs in different application domains through a flexible, modular and low-cost platform that brings intelligence without huge investments. This will also allow them to modernise their legacy systems to further reduce costs. In the port industry, for instance, COSIBAS integration reduces gross hourly labour costs by 20-25%. As the global AI in IoT market is expected to grow from USD 5.1 billion in 2019 to USD 16.2 billion in 2024, the project will also help SMEs to create new business lines in emerging markets, as HI-Iberia has done for smart energy. Due to its combination of negotiation algorithms and prediction algorithms, COSIBAS is uniquely positioned as a P2P trading platform enabler which can meet new grid needs as they arise.

For wider society, greater efficiency in sea traffic will lead to a reduction in greenhouse gas emissions and smart grids will allow for the easier incorporation of renewable energy sources.

These two use-cases are by no means the extent of COSIBAS' impact, as the general nature of the platform will allow FIWARE to be extended to domains where no cognitive solutions have been offered and AI is not currently in use. Nine related projects, eight publications and 22 events and conferences are being used to share the project results, in turn helping to expand the FIWARE community of investors, students, academia, industry and public sector innovators. As the initiative grows, so too will COSIBAS, generating new outcomes for years to come.

Major project outcomes

Dissemination

- Presence and project presentations in more than 20 events and conferences (e.g. Smart City Expo World Congress 2021, Smart City International Conferences 2021, IoT Week 2021, GoTech World 2021, EnerTIC)
- 8 scientific publications (e.g. SCIC 2019, SCIC 2020, FOREN 2020, MDPI Sensors)

Exploitation (so far)

New products:

- Port operations management system (COSIBAS enhancement over Posidonia PortCDM)
- Energy trading platform for a P2P Smart Grid solution

New services:

- FIWARE-based cognitive enabler for integration of cognitive capabilities over a legacy FIWARE platform
- Energy prediction and negotiation algorithms for a P2P smart grid solution
- Smart data visualisation system with extended AI-based features (consumed energy predictions, energy cost predictions) a P2P smart grid solution

New systems:

- Extended FIWARE-based platform for interoperability and integration of existing (and new) AI-based solutions

Standardisation

- Compliant with FIWARE NGSI standards

ITEA is the Eureka R&D&I Cluster on software innovation, enabling a large international 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. ITEA is part of the Eureka Clusters Programme (ECP).

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Partners

Romania

- Beia Consult International

Spain

- Experis ManpowerGroup
- HI Iberia Ingenieria y Proyectos
- Prodevelop

Project start

October 2018

Project end

December 2021

Project leader

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