

COSMOS**Grant Agreement N° 609043*****Cultivate resilient smart Objects for Sustainable city applications***

Newsletter, Issue 1**<23/01/2015>**

Introduction

Dear readers,

We are very glad to introduce you the first newsletter of the COSMOS project

COSMOS is a European project, which is developing a set of methods, tools and techniques to enable smart city IoT applications to take full advantage of its technologies, through three representative scenarios:

Smart Heat and Electricity Management (London)

Journey Planning and Management (Madrid)

IoT Business Eco-System (Taipei)

In a world of multi-stakeholder information and assets provision on top of millions of real-time interacting and communicating things, COSMOS aims at enhancing the sustainability of smart city applications by allowing IoT based systems to reach their full potential. COSMOS will enable things to evolve and act in a more autonomous way, becoming more reliable and smarter. Things will be able to learn based on others experiences, while situational knowledge acquisition and analysis will make things aware of conditions and events affecting their behaviour.

“Data is the raw material that is processed into information. Individual data by itself is not very useful, but volumes of it, which will come from the Internet of Things, can identify trends and patterns. This and other sources of information then come together to form knowledge. Wisdom is then born from knowledge plus experience.” [“The Internet of Things How the Next Evolution of the Internet Is Changing Everything”, CISCO white paper, Evans, 2011]

Realizing the vision of sustainable smart city applications requires for enhancing Internet of Things (IoT) technologies with new ways that will enable things and objects to become more reliable, more resilient, more autonomous and smarter. The quotation above is based on the fact that humans evolve because they communicate, creating knowledge out of data and wisdom based on experience.

Applying this metaphor to the IoT domain means enhancing objects with technologies that would enable them to evolve based on the knowledge derived from the data streams and the experience of their exploitation and of other objects exploitation by IoT applications. According to CISCO, during 2008, the number of things connected to the Internet exceeded the number of people on earth and by 2020 there will be 50 billion, shaping a rich digital environment. Sensors, intelligent fixed and mobile platforms (e.g. smartphones, tablets and home gateways), massive scale cloud infrastructures and other network-enabled devices will all need to cooperate and interact to create value across many sectors in smart cities.

The goal of COSMOS is to enhance the sustainability of smart city applications by exploiting smart and reliable (networks of) things and by being able to utilize a number of heterogeneous device platforms, utilization of which is either inefficient with current management approaches or unfeasible since these platforms may be bounded by their location or the administrative rules under which they operate. Moreover, COSMOS aims at enhancing the sustainability of smart city applications with build-in security and privacy support, while also providing quality of information guarantees through optimized management of the complete data and information lifecycle.

COSMOS will provide an environment for smart city applications through cross-platform channels that incorporate technologies for Data, Information, Things and Decentralized Management.

Thank for your interest in our work.
The COSMOS consortium

What is in store for you?

The project will address specific innovations listed below, together with the concrete results and approaches:

- Things are able to learn based on others' experiences.
- Situational knowledge acquisition and analysis mechanisms make things aware of conditions and events affecting their behaviour.
- Adaptive selection approaches facilitate the management of the uncertainty and volatility introduced due to real-world dynamics.
- Decentralised management mechanisms in IoT based systems allow applications to exploit an increasing amount of interconnected things.
- Socially-enriched coordination considers the role and participation scheme of things in and across networks.

- Management decisions and run-time adaptability are based on things security, trust, administration, location, relationships, information and contextual properties.
- Integrated security and privacy in the IoT domain is developed.
- Extended complex event processing and social media technologies extract only the valuable knowledge from the information flows.
- Workload-optimised data object stores facilitate efficient storage by exploring the interplay between storage and analytics on networks of data objects.

Concrete results that are or will be available with relation to the aforementioned innovations include:

- Semantic models, based on which Things capabilities and properties can be interlinked.
- Case Based Reasoning (CBR) approaches for identifying concrete solutions to given problems that the Things are called to handle.
- Social mechanisms for discovering and evaluating Things and their quality of information.
- Prediction Models for identifying critical parameters in Things management, conclusions extraction and Things awareness.
- Dedicated Hardware boards for integrating security aspects in IoT.
- Enablement of information disclosure levels through the Privelets concept.
- Cloud based Object Storage incorporation, enabling per case specialised data processing, metadata search and manipulation through the application of the Storlets concept.

How to put COSMOS in place?

Smart Heat and Electricity Management (London)

Camden, in Central London, is responsible for all of the civic duties in the borough and owns and manages some 33,000 dwellings, both tenanted and leasehold. It also has a corporate environmental policy which aims to reduce overall carbon emissions by 27% by 2017 and 40% by 2020; and a “Digital Strategy 2014-17” which commits to “taking advantage of the emerging ‘internet of things’ to redesign smarter public services around citizens and businesses”.

In addition, Camden’s dedication to addressing the issues of fuel poverty, affordable warmth and energy efficiency can be demonstrated by not only having a corporate sustainability unit but also a pioneering sustainability team for its own housing stock. The housing sustainability team are well on target to reduce emissions by the 2017 target. The team is keen to try out new approaches and technologies and learn how to best utilise resources. Through the extended capabilities offered by the COSMOS project, officers will be enabled to undertake a more rigorous cost/benefit analysis of suggested programmes or technology installations. This will be via a system that provides accurate information on the carbon/monetary saving of any given deliverable. The interconnected IoT-based system will also make possible more effective management of the energy supplied in order to minimise carbon production and reduce fuel demand.

Intelligent Transportation System (Madrid)

In Madrid, EMT operates the city bus lines (in total 203 lines) through a fleet of 1,903 vehicles, which have an average age of 6.64 years. In 2013, EMT run 91.03 million kilometers, moving 404,1 million passengers.. The buses are equipped with GPS devices providing information regarding their location and speed. Moreover, all buses are equipped with wifi on board. In addition to that, the City of Madrid has deployed some sensors in the streets associated to the traffic lights, which can be found throughout the city and allow remote management.

In this scenario we propose to take into consideration the available information from mobile sensors deployed in the buses regarding the routes, vehicle information such as car speed, location information from GPS devices, as well as from static city sensors such as traffic lights location and changing intervals. Additional information may be provided by citizens from their mobile devices (such as smartphones and tablets). Given the big number of vehicles and their operation, the goal of the scenario is for COSMOS to provide the ability to manage the different things as well as the reliability of the information they provide, in order to provide different services to passengers and to improve not only the bus service but the city management itself..

IoT Business Eco-System (Taipei)

Smart Network System Institute (SNSI), a research institute of the Institute for Information Industry (III), has developed a solution named iFamily for smart home energy management, with open integrated software, hardware and services.

iFamily smart home energy management system is Taiwan 's first home energy management suite and cloud management platform that allows consumers to monitor home appliances anytime, anywhere. Consumer can use the mobile phone app to control appliances such as thermos, air conditioners and other electronic products, help people monitor home electricity exactly and improve home energy efficiency.

The iFamily service is working together with other projects in the SNSI to create an integrated approach to energy management in the context of a smart city. Each household participate is feeding demand information into larger analysis in such a way that house/neighbourhood level renewables, demand shift and efficiency programmes can be implemented to benefit the city as a whole.

Did you know that?

COSMOS has already published articles related to our research goals. Following, a list of these publications is included.

Publications

- Orfefs Voutyras, Spyridon V. Gogouvitis, Achilleas Marinakis, Theodora Varvarigou, “Achieving Autonomicity in IoT systems via Situational-Aware, Cognitive and Social Things”, 18th Panhellenic Conference on Informatics (PCI2014), 02-04/10/2014, Athens, Greece.

- Orfefs Voutyras, Panagiotis Bourellos, Dimosthenis Kyriazis, Theodora Varvarigou, “An Architecture supporting Knowledge flow in Social Internet of Things systems”, Third International Workshop on Internet of Things Communications and Technologies (IoT-CT 2014), 08-10/10/2014 Larnaca, Cyprus.
- Adnan Akbar, Michele Nati, Francois Carrez, Klaus Moessner, “Contextual Occupancy detection using Non-Intrusive Load Monitoring for Smart Office”, to be presented at IEEE International Conference on Communications, 08-12/06/2015, London, UK.
- Orfefs Voutyras, Panagiotis Bourellos, Spyridon V. Gogouvitis, Dimosthenis Kyriazis, Theodora Varvarigou, “Social Monitoring and Social Analysis in Internet of Things Virtual Networks”, to be presented at 18th International ICIN Conference (ICIN 2015), 17-19/02/2015 ,Paris, France.

Attended Events

There is a wide range of events in which COSMOS aims in order to reach audiences and demonstrate our work and results. We will present briefly the events that we already attended during the project.

Mobile World Congress 2014:

The GSMA Mobile World Congress includes a world-class conference featuring visionary keynotes and action-provoking panel discussions, including an exhibition with more than 1,800 companies displaying the cutting-edge products and technologies. In 2014, Mobile World Congress hosted more than 85,000 mobile professionals from more than 200 countries. The exhibition was organised on 24-27 February 2014 in Barcelona with main subject on the mobile industry. COSMOS was represented via a general rolling presentation and a stand-alone poster.

Future Internet Assembly:

FIA Athens 2014 took place at the Megaron Athens International Conference Centre. FIA Athens has featured an exhibition of innovative ICT projects, technologies and their demonstrations. The aim was to provide Future Internet stakeholders and other participants with up-to-date information and a hands-on experience on the latest Future Internet applications, systems and services, prototypes and innovative solutions. Moreover, the exhibition aimed at addressing key questions for delegates and providing an informal networking environment. COSMOS showed participation in the FIA event which took place in Athens on 17/3/2014 with a general presentation of the project and the objectives that we aim for.

IoT Week 2014:

The IoT week is a yearly event organised by the IoT Forum. The IoT Week 2014 was hosted in London between the 16th and 20th June at the Grange Tower Bridge Hotel located in the heart of the city. The event was the pre-eminent event attracting industry and academia from around the world aiming at:

- Bringing focus to the emerging opportunities;
- Connecting the global business and research communities innovating at the boundaries of IoT;
- Promoting international collaboration and addressing societal and market issues.

In this event COSMOS was represented in a booth for early dissemination of project objectives and early results (in the form of slide sets, brochures, USB flash drives and a roll-up poster in particular). More interest on the project was shown on the planned autonomous nature of virtual entities, the Cloud storage technologies used and the potential scenarios regarding the implementation of the project.

European Researchers' Night.

European Researcher's Night is a mega event which takes place every year simultaneously in several hundred cities all over Europe. This year, among other venues in Greece, the event took place in NTUA's premises in downtown Athens, on Friday, 26 September 2014 between 18:00 and 24:00. It addresses mainly the general public but also fellow researchers, NTUA students etc.

COSMOS was included in the DKMS lab booth and material from the project was made available through the following channels:

- DKMS Lab presentation through a projector, including all the lab projects with main highlights and achievements;
- Distribution of the COSMOS Factsheet and bookmarks in a printed version.

IoT-360 2014:

The IoT-360 is a unique event bringing a 360 degree perspective on IoT-related projects and activities and aiming to coach involved people on the whole path between research to innovation and all the way through to commercialisation of ideas, projects and technologies. During this event, COSMOS showed a presentation and a relevant demo, which deals with the domain of privacy for IoT Data. The demo highlighted how the concept of Storlets can be used for facial blurring, in order to enable people to retain privacy when they securely upload their photos in the cloud.

Where to look next

We are happy to announce that we have finalized our participation in the following events:

SIDO 2015: <http://www.sido-event.com/en>

SIDO 2015 is an IoT event aiming to attract 4000 professionals and will have 150 booths. It will take place in Lyon, France on April 7 & 8. COSMOS project will be included in the IERC village and we are looking forward to meeting you in our booth!

Do you want to be part of it or know about it?

Register with our newsletter through the website (<http://iot-cosmos.eu/>), contact us in andrea.rossi@atos.net or:

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