

Project Results

A2Nets

Machine to Machine communication

The estimated number of communicating devices today, including intelligent machines, vehicles and sensors, is around one trillion, and growing. Future communication is likely to be effected mainly through interaction between machines. However, the complexity and vertical silo problems inherent in the highly fragmented vertical domains must first be addressed. The ITEA 2 project A2Nets took up this challenge of applying autonomic computing and communication paradigms to exploit the real power of such M2M networks.

FROM VERTICAL TO HORIZONTAL

The project consortium focused on an industry-wide smart M2M service approach whereby autonomic computing lowers the amount of actions required from human users and performs autonomic actions in the higher abstraction level of the M2M system, enabling the interaction of applications that had not initially been intended for such purposes. The essential shift from vertical towards horizontal has been enabled by the horizontal M2M architecture approach and a set of its' key building blocks, such as autonomic M2M (knowledge based) manager, ETSI-compliant service capability layer, XMPP based M2M messaging, related M2M gateways and interworking proxies capable of connecting embedded systems to back-ends, and means for trust creation to enable end to end security for M2M applications. The project has created a new model and prototype for end-to-end

security management and remote LAN security management as well a proposal for the MIM (Modular Identity Module) hardware design. This was all complemented and substantiated by a horizontal M2M service platform – Platform as a Service – with cloud data management that includes the abstraction of M2M services from transportation layer and protocols.

Among the technology enhancements within the architectural approach were several innovation bricks, namely an autonomic M2M manager, ontology based reasoning, network virtualisation, energy-efficient communication, Bluetooth low-energy and energy-efficient ipv6 multicast for firmware update. In terms of the project's contributions to M2M business aspects, M2M service capabilities, security/trust and devices/service were all developed as a horizontal service.

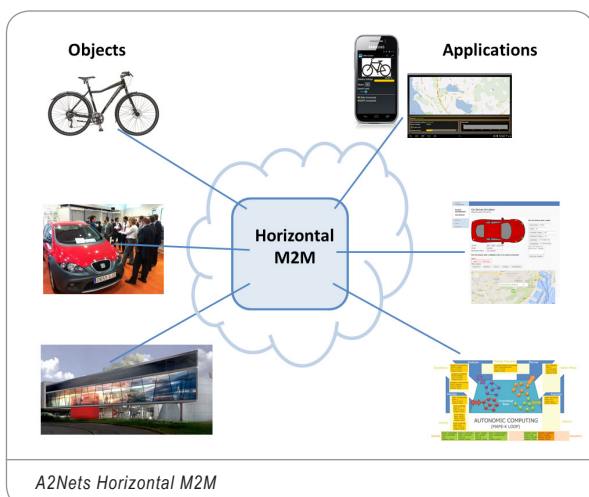
KEY ENABLERS

The key enablers developed within the project were evaluated separately in different scenarios dealing with smart metering, car sharing and electric bike experiments. The results show that the architectural principles and key enablers establish a solid foundation for future research and seem to enable communication between objects and applications, which had not initially been designed to communicate together.

The key results have been published in scientific papers while contributions to M2M standardisation comprised OneM2M, 3GPP/MTC standards (Gemalto), Bluetooth SIG (Polar), Cea (IETF), XMPP foundation (VTT), IEEE RAS (LSSI), ETSI M2M (Laas). The project's results were disseminated through more than 45 publications, 20 public presentations and 3 press releases. A publication of a technology survey is well under way and the architecture approach has been published in Future Internet journal. There is also a professionally produced promotional video for the project.

EXPLOITING THE RESULTS

The potential for infrastructures/enablers is strong among the consortium partners; the project partners have created more than 21 commercial or precommercial products. For example, Bull is using an "out of the box" M2M service platform to help customers focus on core business services and choose the most



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Partners

AGGRUPA
 ATOS S.A.E. Origin
 Bull S.A.S.
 CEA
 Centre National de la Recherche Scientifique
 CTech
 eDevice SA
 Ericsson Arastırma Gelistirme ve Bilisim Hizmetle
 Fundacion Tecnalia Research & Innovation
 Gemalto SA
 Innova IT Solutions Inc
 LNL Elektrik Elektronik Bilisim ve Danismanlık Ltd. Sti.
 Mirakonta
 Planray
 Polar Electro Oy
 Rucker Lypsa
 Thales Communications and Security
 Tracker Oy
 Universitat Autònoma de Barcelona (UAB)
 University Paris XII
 Vektor
 Vibsolat Ltd
 VTT Technical Research Centre of Finland

Countries involved

Finland
 France
 Spain
 Turkey

Project start

November 2010

Project end

June 2014

Contact

Project Leader :

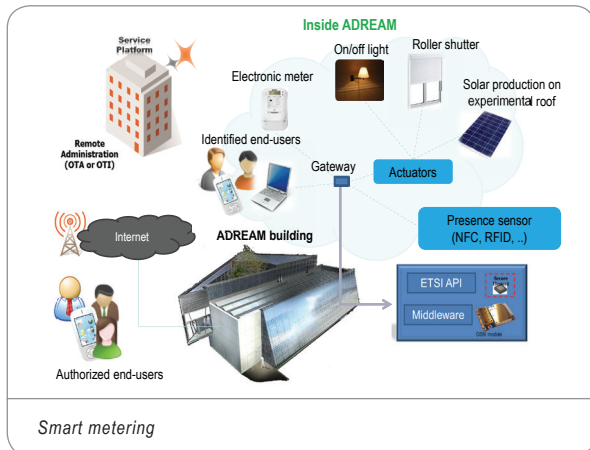
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suitable service provider. In addition, this service platform facilitates M2M data management through cloud services such as data storage and big data. Gemalto has developed a M2M trust manager built around an authorisation server to manage the distribution of credentials used to achieve end-to-end security. This trust manager supports detailed specification of how an application is authorised to interact with a device, and use of secure elements packaged to the M2M device using standard industry interface such as I2c or SPI. In terms of fast exploitation of results, Polar, a Finnish company that develops heart rate-based training solutions worldwide, has created an ecosystem that has led to new products in smart sports wearables and to more than 20% growth. The French company eDevice, which designs and develops innovative solutions for machine-to-machine



and eHealth connectivity, now has its first ETSI compliant client embedded in a 2G/3G Terminal/Modem while the SME company Tracker is using the results to help hunters and reindeer herders manage their free-roaming herds in remote areas in the north of Scandinavia.

PROMISING MARKET

The project has created a powerful springboard for European industry to take a leading position in this very crucial area, having provided a real avenue for the innovations as is evident in the more than twenty products that have made use of the project's results. As vertical markets continue to expand, horizontal service providers are expected to win more market share because they are able to offer their solutions to multiple domain applications. The market clearly offers plenty of potential with M2M experiencing explosive growth in vertical markets and creates strong basis for the future Internet of Things/Cyber-Physical Systems. The huge growth that is expected will make this a multi-billion dollar market.

Major project outcomes

DISSEMINATION

- 45+ publications in journals, book chapters and conferences related to Reliable routing, autonomic computing, semantic data models, M2M architectures, and mobile M2M
- 20 presentations including speeches, demos and workshop presentations
- 3 press releases

EXPLOITATION (SO FAR)

- 21+ products, e.g. Aggrupa (virtualisation platform), Atos (M2M platform), Bull (B-Trust, Agate), C2Tech (Data fusion engine), eDevice (CellGO3G), Ericsson (sensor management software), Gemalto (Trusted service manager), Innova (System integrator), LNL (smart sensors, actuators & gateway), Mirakonta (remote sensors, actuators), Polar (Ecosystem), Planray (Heating control system), Tracker (Dog/reindeer tracking system, navigation for hunters), Vektor (vehicle telematics service), Vibsolas (Gea)

STANDARDISATION

- contributions (>20) to IETF Roll WG (CEA), OneM2M security and 3GPP (Gemalto), IEEE ORA (LISSI), Bluetooth SIG (Polar), XMPP foundation (VTT), ETSI M2M (LAAS-CNRS)
- attending in ITU-T (eDevice), OGC SWE (Vektor), OneM2M (LAAS-CNRS)

PATENTS

- at least 2

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■ ITEA 2 – Information Technology for European Advancement – is Europe's premier co-operative R&D programme driving pre-competitive research on embedded and distributed software-intensive systems and services. As a EUREKA strategic Cluster, we support co-ordinated national funding submissions and provide the link between those who provide finance, technology and software engineering. Our aim is to mobilise a total of 20,000 person-years over the full eight-year period of our programme from 2006 to 2013.

■ ITEA 2-labelled projects are industry-driven initiatives building vital middleware and preparing standards to lay the foundations for the next generation of products, systems, appliances and services. Our programme results in real product innovation that boosts European competitiveness in a wide range of industries. Specifically, we play a key role in crucial application domains where software dominates, such as aerospace, automotive, consumer electronics, healthcare/medical systems and telecommunications.

■ ITEA 2 projects involve complementary R&D from at least two companies in two countries. We issue annual Calls for Projects, evaluate projects and help bring research partners together. Our projects are open to partners from large industrial companies and small and medium-sized enterprises (SMEs) as well as public research institutes and universities.



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