ITEA 2

INFORMATION TECHNOLOGY FOR EUROPEAN ADVANCEMENT

A2NETS

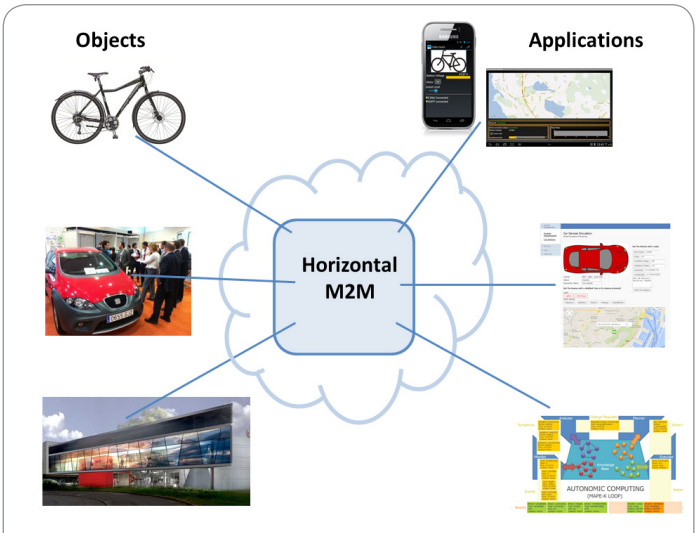
INNOVATION REPORT

A horizontal solution to vertical problems

EUREKA

Juhani Latvakoski, VTT Technical Research Centre Finland

Sensors, actuators, memory devices, radio-frequency (RFID) tags and various machines today have the ability to communicate. The proliferation of such devices is staggering in the connected world that is the Internet of Things (IoT). The estimated number of communicating devices, including intelligent machines, vehicles and sensors, is around one trillion, and growing. Europe alone has the potential for 600 million wireless M2M connections. Given this scenario, it seems plausible that the majority of future communication will be effected through interaction between machines. However, the variety of vertical domains and manufacturers as well as the complexity of the challenge could combine to leave such a prospect more of a dream than a reality.



A2Nets Horizontal M2M

From vertical to horizontal

So, given the complexity and vertical silo problems left by these highly fragmented vertical domains with subsequently increased R&D costs in each specific domain, the A2Nets ITEA 2 project took up the challenge of applying autonomic computing and communication paradigms to exploit the real power of such M2M networks. By focusing on a horizontal M2M standard-based approach, the project consortium aimed to arrive at an industry-wide smart M2M service approach whereby autonomic computing reduces 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.

In concrete terms, the project generated a number of key innovations that all lay a real foundation for future exploitation. The architectural approach incorporated an M2M gateway and communication overlay concept with an M2M service platform along with trust and end-to-end security. 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.

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 (dissociation of data distribution and trust) and remote LAN security management (including energy constrained LAN devices) as well a proposal for the MIM (Modular Identity Module) hardware design.

Underwriting the value

The selected set of key enablers developed within the project were evaluated separately in different scenarios that centred on smart metering, car sharing and electric bike experiments. The evaluation 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.

ITEA 2

INFORMATION TECHNOLOGY FOR EUROPEAN ADVANCEMENT

A2NETS

INNOVATION REPORT

Exploiting the results

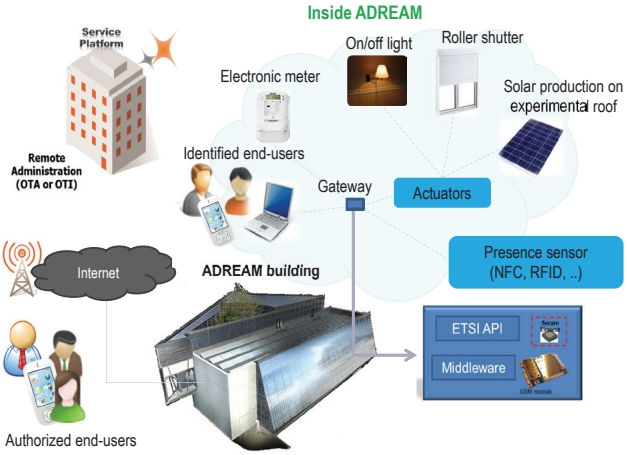
The potential for infrastructures/enablers is strong among the consortium partners. Project partners have created more than 21 commercial or precommercial products. For example, Bull is using an “out of the box” M2M service platform as a Platform as a Service to help customers focus on core business services and provide a solution whereby customers can choose the most 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 already taken advantage of A2Nets by creating the Polar 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 thanks to its involvement in this ITEA 2 project. And the SME company Tracker has used the results of the project to help hunters and reindeer herders manage their free-roaming herds in remote areas in the north of Scandinavia.

Prospects of a boom

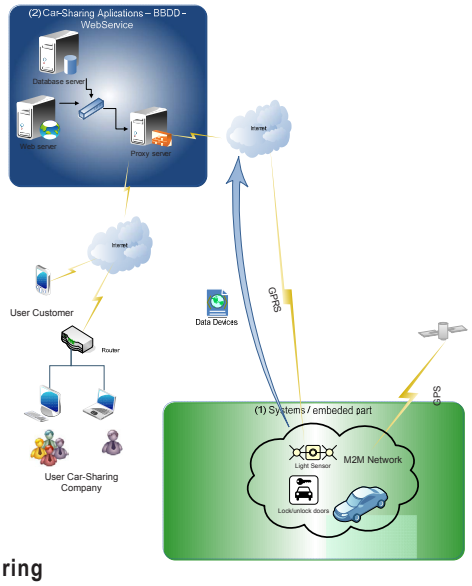
The way in which the project has contributed to M2M business aspects can be regarded as having created a powerful springboard for European industry to take a leading position in this very crucial area. The fact that the project has provided a real avenue for the innovations to be implemented is evident in the more than twenty products that have been realised through the application 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 a strong basis for the future Internet of Things/Cyber-Physical Systems. With the bottlenecks of end-to-end security, integration with IT and value chain coordination (interoperability) addressed, the huge growth that is expected will make this a multi-billion dollar market.

More information:
https://itea3.org/project/a2nets.html

Electric bike ecosystem



Smart metering



Car sharing

A2Nets innovative business cases