M2MGrids

From vertical M2M silos towards smart interoperable Cyber-Physical Systems

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The M2MGrids project aimed at creating enablers for a dynamic cyber-physical information ecosystem that would interoperate in real time with the business processes of companies with real-life objects, people and things. M2MGrids focused on major disruptions in targeted energy and mobility domains. The disruption in the energy domain was related to operating models and the high cost of peak hours in energy grids. To make more efficient use of the energy grid, there needed to be a flexible and automated means by which to control both consumption and generation between multiple energy stakeholders and prosumers. The inability of multiple stakeholder systems to exchange information in dynamic situations (such as in a traffic accident) was leading to disruptions in the mobility domain.

Impact highlights

- The World Wide Streams (WWS) horizontal service platform developed by Nokia Bell Labs can, already today, be considered to enable a 20-30% higher business growth in application-enabling Digital Value Platform (DVP) projects for these segments worldwide.
- For Tracker, the commercialisation impact estimation of the M2MGrids project including device and related services sales is about €3 m in 2020. The development is essential in Tracker growth, and four persons were employed permanently even after the project, with market share potentially increasing in future.
- Slimmer AI developed machine-learning knowledge of short-term energy consumption forecasting from daily down to 15-minutes horizons (called nowcasting) within M2MGrids. Slimmer AI expects to employ up to 10 colleagues on the basis of this M2MGrids technology within three years.
- LiveU has opened significant market opportunities, having won a tender for the next Olympic games with the Japanese police department and also having collaborated with Associated Press on a new live video exchange newsgathering platform: AP Live Community, an app based on M2M.
- Several new research opportunities were identified during the project and these have led to the preparation of EU-wide research and national coinnovation projects including e.g. INTERRFACE (flexibility markets), TIoCPS (trustworthy communities), iFLEX (end-user perspective for flexibility markets) and OneNet (scaling of flexibility market mechanisms).

Project results

The project developed a horizontal M2MGrids architecture framework, with a set of novel horizontal capabilities related to information models, algorithmic operation, stream processing, communication overlays, security, and specific capabilities of horizontal platforms that enable embedded products to be part of the cyber-world. These novel capabilities were evaluated in the energy flexibility and traffic accident use cases.

The demonstration of the energy flexibility use case included an evaluation of the World Wide Streams (WWS) horizontal service platform developed by Nokia Bell Labs. In the demonstration, WWS acted as a key horizontal enabler for a set of energy flexibility services interacting to balance the power level and reduce the peak loads in the distribution grid. The demonstration of the traffic accident use case included an evaluation of the virtual CPS communication hub, realised by VTT, which enables mobile embedded products and services of multiple stakeholders to horizontally interact and exchange information in a controlled and secure way.

Exploitation

The Nokia World Wide Streams (WWS) platform, as matured for distributed multi-actor automation scenarios in M2MGrids, is now enabling a Nokia Enterprise business unit product, and is regularly used in customer trials. The Nokia Enterprise TEPS (Transport, Energy and Public Sector) segment sales unit promotes WWS as an enabler for flexible launching of services as part of segment solution toolkits.

The knowledge developed by Empower IM has led to activities for preparation of national infrastructure for energy flexibility in Finland targeted to new flexibility markets with national TSOs and local DSOs of the energy ecosystem. Bittium created a Medical Analysis cloud ('MA-Cloud') solution, which was the basis for Bittium's neurology businesses in the Medical business area, enabling quick measurement in field conditions as well as in hospitals, thus making the treatment process of the patient faster. Tracker developed a low-power development platform for new products, applications and services for monitoring, tracking and control in M2MGrids. The platform led to the development of the Tracker Artemis product, the world's first 4G IoT dog tracking collar, which is now generally available. Technolution developed a sensor prototype for sensing power quality as well as congestion analysis and prediction in M2MGrids, which led to the Technolution LS/MS sensor product, which is now offered in different markets for non-intrusive, cost-effective and high-quality sensing. For Slimmer AI (formerly Target Holding) the knowledge developed during the project has boosted the development of new, AI-powered forecasting and balancing solutions. Arcelik was first to introduce new, automated demand/response compatible household appliance products. KoçSistem enabled energy management of adaptive demand-supply household and industry devices as well as energy grid adaptive demand-supply gateways. Eteration developed a Complex Event Processor that manages real-time events within big data according to the execution plans.

The M2MGrids project contributed strongly towards shifting from vertical use towards more horizontal capabilities in the IoT product development. It also contributed to the development of smartness and interoperability for CPS.

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PROJECT LEADER

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PROJECT START

November 2014

PROJECT END

May 2018

PROJECT WEBSITE

https://itea4.org/project/m2mgrids.html

PARTNERS

Belgium
- Nokia ●
- Sony Depthsensing Solutions ⊙
- Spikes ⊙

Finland
- Aidon ⊙
- Bittium Wireless ●
- Empower IM ●
- Polar Electro ●
- Tracker ⊙
- Valopaa ⊙
- VTT Technical Research Centre of Finland ○

Israel
- LiveU ⊙
- Starhome ●

The Netherlands
- Alliander ●
- Delft University of Technology ◉
- Eindhoven University of Technology ◉
- IMEC ○
- Neroa ⊙
- Slimmer.AI ⊙
- Technolution ⊙
- TNO ○

Portugal
- Evoleo Technologies ⊙
- ISEP/IPP-GECAD ◉
- ISQ ●

Turkey
- Arcelik ●
- Eteration Bilisim Cozumleri ve Ticaret ⊙
- KoçSistem Information and Communication Services ●
- Phaymobile ⊙
- Vektor Telekom ⊙

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