Semantics of Smart Appliances

Available semantics assets for the interoperability of smart appliances.
Mapping into a common ontology as an M2M application layer semantics.
SMART 2013/0077

10 March, Workshop Ecodesign Preparatory Study, Brussels

Context

- ETSI M2M developed functional architecture. Next step is data models. Many are already developed by other organizations. How can they be re-used?
- In 2012, EC hosted a workshop “Roadmap for the Standardization of Smart Appliances (Energy Consuming and Producing Products)
- Present: E2BA, CECED, Eu.bac, ELC, SGTF, ETSI M2M, CENELEC TC59x WG7, HGI, buildingSmart Int., OASIS oBIX, OSGi.
- Main recommendations:
  - High-level semantic model is needed, including common vocabulary for appliances’ product information, commands, signals, feedback.
  - Agree on a common architecture and open repositories with reusable pieces to create a bridge over the communication layer chaos.
- ETSI created SMART M2M TC as a follow-up on ETSI M2M

Scope

- **Domains:** Homes, private dwellings, common public buildings and offices
- **Appliances:** Home and building sensors, white goods, HVAC, Lighting, Micro-renewable home solutions, Multimedia and PC equipment
- **Use cases:** Interoperability with construction design tools, facility management systems, energy management systems, building control systems, ESCO systems, Smart Grid
- **Stakeholders:** manufacturers of white goods, HVAC, plumbing, security and electrical systems, lightings, sensors, actuators, micro-renewable home solutions, multimedia, and computers. And related industry, such as utilities, operators, architects, service providers...

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TNO’s work:

1. Take stock of existing semantic assets
2. Translate assets into a common ontology and provide a mapping between the models
3. Document the common ontology into ETSI M2M architecture

Project started January 1st 2014, finishes with final workshop on April 1st 2015.

Projectteam:

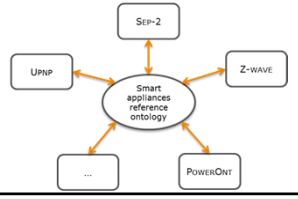
Task 1: Stocktaking

- Started with a long list of 47 heterogeneous assets which we described
- From the long list created a short list of 23 assets that we used in task 2 and 3.
- Short list contains the following assets:

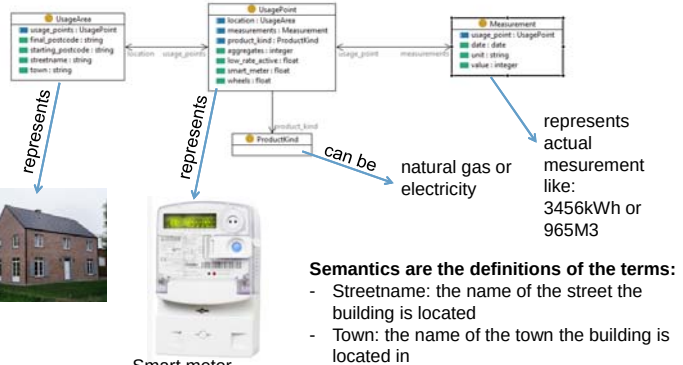
• ECHONET	• W3C SSN
• FIEMSER	• OSGi DAL
• UPnP	• eDIANA
• SmartCoDE	• FAN
• OMA Lightweight M2M	• DECT ULE
• SEP2	• Z-Wave
• EnOcean	• SEEMPubs
• OMS	• PowerOnt (previously SEIPF)
• Hydra	• FIPA
• KNX	• Mirabel

Task 2: Create ontologies and provide mapping

- For the items on the short list we created ontologies or they were given to us
- An ontology is a formal model that captures the semantics of the reality. It covers the relevant concepts, their definitions and the relations between the concepts.
- Based on the ontologies created, we created the Smart Appliances Reference (SAREF) ontology which contains the generic concepts of the ontologies we started with.
- Next to that we defined the mappings between the concepts in the ontologies from the short list to the SAREF ontology



Simple energy ontology

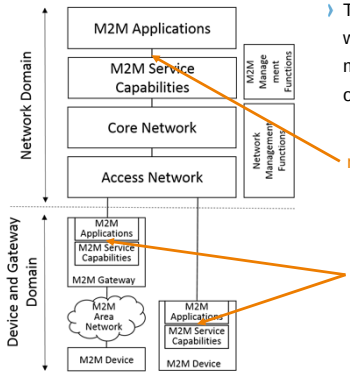


Semantics are the definitions of the terms:

- Streetname: the name of the street the building is located
- Town: the name of the town the building is located in
- Productkind: the product that is measured by the smart meter

Visual representation of draft Smart Appliances Reference ontology

Task 3: Mapping of SAREF into ETSI M2M architecture



- To show how the SAREF ontology could work with the ETSI M2M (Machine-to-machine) Architecture we mapped the ontology to the architecture

mIa

dIa

This is where SAREF applies

The M2M Applications run the service logic and use M2M Service Capabilities accessible via an open interface. This interface is called "dIa" for device applications and "mIa" for network applications.

More information at:

- LinkedIn group: http://www.linkedin.com/groups/Workshop-Stakeholders-on-Smart-Appliances-7450648
- Website: http://sites.google.com/site/smartappliancesproject
- SAREF ontology: http://ontology.tno.nl/saref.ttl and http://ontology.tno.nl/saref (documentation)
- Review of reports: http://sap.etsi.org