DG CONNECT’s initiative on Smart M2M Appliances

Svetoslav Mihaylov
svetoslav.mihaylov@ec.europa.eu
DG CONNECT
Sustainable and Secure Society
Smart Cities and Sustainability

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DG CONNECT Unit H5 priorities
- Smart Cities
- Resource Efficient Infrastructure
- Interoperability of Energy Data in Buildings
- The market/Costs of the connectivity
- Scope of the interoperability use cases
- Scope of the initiative
- Collection and translation of semantic assets

Agenda

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- European Innovation Partnership
  - 2012: Launch – EC Communication
  - 2013: Strategic Implementation Plan
  - 2014: Call for Commitments - 360 eligible commitments (>3000 partners) received with good sectoral and geographic mix
  - Six active action clusters with several sub-clusters
  - Ongoing - Online marketplace; Matchmaking; Easing access to public and private funding; Exchange of best practices and aggregate demand
  - More info: http://eu-smartcities.eu/
- Smart Cities in Horizon 2020 (WP 2014-2015)
  - Lighthouse projects & Support actions (200M€)

Smart Cities

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- City living (Smart Cities)
  - Resource Efficient Infrastructures
  
  The two priorities are closely linked.

Using ICT as a tool in meeting the EU’s climate and energy targets.

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Resource Efficient Infrastructures

- Smart Grids
- Water & Waste
- Transport
- Data Centres
- Energy Efficient Buildings/homes
- Smart M2M Appliances

Interoperability of Energy Data in Buildings

Buildings lifecycle

- COMMON FIRST DRIVER IS ENERGY EFFICIENCY
- Later, shared with eHealth, Surveillance, eInclusion, etc.

The market/Costs of the connectivity

- Ad hoc circuits with existing network solutions; 100,000’s; > 50 EUR per appliance
- Simple consumer devices; energy plugs; > 10 EUR per appliance
- A universal appliances chip; billions (250 million dwellings in Europe; many appliances each); < 1 EUR per appliance. “Any appliance to any service” embedded system.

One "language" to the external world, one ONTOLOGY

Interoperability use cases

- Interoperability with construction design tools (product information, product performance and product behaviour), architects CAD, BIM, documentation
- Interoperability with Facility Management and Energy Management Systems
- Interoperability with Building Control systems
- ESCO (Energy Services) systems
- Interoperability with the Smart Grid

Empower the CITIZEN
**Scope of initiative**

Two related loops

- **Study**
- **Standardisation**

**What do you want to say?**

To make sure that the requirements of the Energy Efficiency “irtual reality” are collected in a structured way, in a near M2M “service Capability Layer” (SCL) format.

**Say it properly**

To make sure it is made fully M2M-conformant and integrated as an asset of the M2M community.

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**Translation to formal language, matching**

- **Switch off**
  - Calienta mas
  - Enemmän valoa
  - Wat de temperatuur
  - Fermer la fenêtre
  - Ποια είναι η υγρασία

- **e.supply**
  - device.A
  - device.B

- **status**
  - boolean = "false"

- **heats**
  - intensity
  - change.rate

- **lights**
  - intensity
  - change.rate

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**Collection of semantic assets and use case assets**

- **Inventory of semantic assets**
- **Application semantics**
- **Connectivity semantics**
- **Use cases**

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**Thank you for your attention!**

Any questions?

svetoslav.mihaylov@ec.europa.eu

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Scope of appliances to be covered

- Home and buildings sensors (temperature, humidity, energy plugs, energy clamps, energy meters, water-flow, water quality, presence, occupancy, air monitors, environmental sensors, CO2 sensors, weather stations, etc.) and actuators (windows, doors, stores). Sensors belonging to appliances treated individually.
- White goods, as classified by CECED,
  - Rinsing and Cleaning
  - Cooking and Baking
  - Refrigerating and Freezing
  - Vacuum Cleaning
  - Washing and Drying
- HVAC; heating, ventilation, and air conditioning, plumbing, security and electrical systems
- Lighting, with use cases as defined by ELC
- Micro renewable home solutions (solar panels, solar heaters, wind, etc.)
- **COMMON FIRST DRIVER IS ENERGY EFFICIENCY**
- Later, shared with eHealth, Surveillance, eInclusion, etc.

Costs of the connectivity

- **Ad hoc circuits** connecting to existing Network solutions; 100.000's; > 50 EUR per appliance
- Simple **consumer devices**; energy plugs; > 10 EUR per appliance
- A **universal appliances chip**; billions; < 1 EUR per appliance

The unified ontology

- **EupP**
- **plug**
- **play**
- **fixed**
- **product**
- **low power**
- **Ee KPI**
- **real time**
- **other**
- **Ee KPI**
- **planned**

Sub-products
- XML data models
- Web services
- Etc.
Implementation

Options to make "plug & play" a meaningful feature
For example
Consideration of the symbol on existing labels
- ErP - Energy label (compulsory)
- Voluntary labels
- Mandatory disclosure on the packaging
- Certification by industry themselves

Energy using and producing Products

The home things
Part of the Internet of Things

EupP Plug and Play

- October 2014: Launch of "preparatory study" analysing the technical, economic, environmental, market and societal aspects with a view to a broad introduction of smart appliances" under the Ecodesign Framework (which can also be the basis for an Energy Labelling regulation)
- Duration: 24 months
- "Smart appliances" – White goods, HVAC, compressors, lighting, micro-power sources
- Main Issues: What functionalities, use cases and architectures, access to information, interoperability gaps, potentials, impacts on consumers and industry, energy consumption linked to the "smartness"?
Recommendations

1. **Backwards interoperability**: The ontology has to aim, wherever possible, at providing “backwards” compatibility to the semantic layers of the most popular connectivity solutions (KNX, BACnet, ZigBee, SensorXML), ensuring the highest degree of matching. However, this is not an absolute condition.

2. **Expanded ontology**: The ontology should not be restricted to the existing vocabularies in these solutions. It has to be expanded to cover all semantic requirements as discovered in the study.

3. **New structure**: In particular with respect the basic structure, not to be constrained by any heritage from the past.

4. **Balanced solution**: Too strict backwards compatibility may eventually turn into low efficiency solutions or bring down the new thinking that we need for defining the correct semantics. Propose a balanced solution and document the options taken.

5. **Energy efficient solution**: The home environment may require not wired low power sensors based on batteries or ambient energy harvesting sensors. The ontology has to be optimised to be synthetic, compact and with the minimum redundancy.

6. **Smart messaging**: The ontology has to propose classes to cover a broader scope of information exchange, messages with information relevant for the intelligent behaviour in relation to energy and beyond. As said above, the vision is autonomous smart appliances that mainly negotiate their flexibility at consuming energy, but will expand in the future to broader application areas (eHealth, Ambient Assisted Living, surveillance, etc.).

7. **Optimal balance open/prescriptive**: Propose an optimal balance between fixed and full definitions for some classes (i.e. including enumerations), those with chances to be relevant to most use cases (i.e. energy consumption, limits, goals), and classes that should remain open for a definition of the meaning by the context (i.e. appliance specific, or system specific) or case by case (<otherClass>) or live at connecting. Fully defined classes offer the highest chances for compact coding at transmission, and are therefore more important at non-cabled devices, like battery powered sensors. At appliances connected to the electricity network this factor is less critical.

8. **Growth of the ontology**: logic for the growth of the ontology to cover future, more intelligent behaviour and message exchange.