



**Workshop on
A Roadmap for the
Standardisation of
Smart Appliances**

Smart appliances in Energy-efficient buildings

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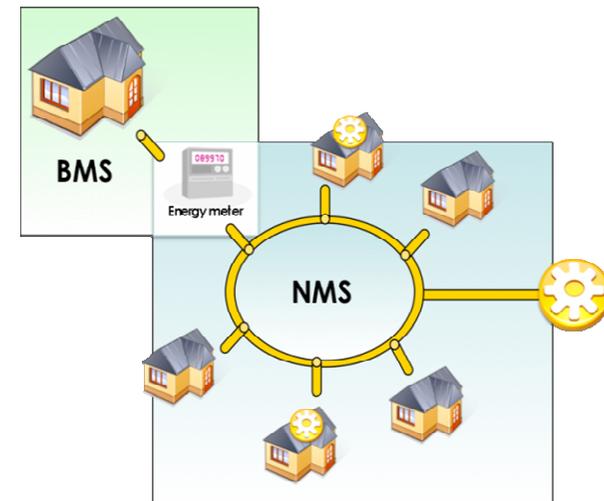
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Few words on CSTB, ECTP & E2BA

- **CSTB is a French public organisation doing research, consultancy, technological assessment, and knowledge dissemination in the Building sector**
- **ECTP**
 - European Construction Technology Platform
 - Develop research and innovation strategies
- **E2BA**
 - Energy-Efficient Building Association
 - Is the private partner of the EC in the EeB PPP to define and coordinate actions to drastically reduce energy consumption and CO2 emissions of buildings & districts
- **ECTP & E2BA gather 230 member-organisations**
- **CSTB provides General Secretariat for ECTP & E2BA**

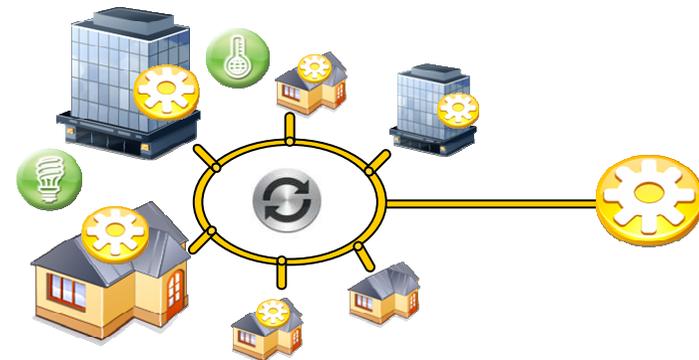
Smart Buildings in Smart Grids

- Buildings are responsible for up to 40% of energy use and GHG emissions in most EU countries
- "20-20-20" targets
- Solutions to improve energy efficiency should be envisaged by considering buildings not isolated, but as components of larger systems, interacting through smart energy grids
- Buildings are shifting from pure energy consumers to energy prosumers (both consumers and producers)



A systemic approach

- **Shift from an eeBMS approach to an eeNMS approach, targeting an optimisation of energy balance (demand vs supply) including:**
 - Decentralized/distributed (local) energy production
 - Storage of energy (esp. electricity)
 - Renewable energy sources
 - ... with varied energy production and/or demand profiles
 - ... and taking into account multi-constraints sets (regulations, urban planning...)



- **Need for:**
 - Extended communication and information sharing between network components
 - More interoperability
 - Standardized interfaces
 - Definition of new roles with new associated business models

Smart Appliances & Intelligent control

- **Smart Appliances**

- Home (energy consuming) devices that can communicate on their energy features, status/operating conditions, and be (optimally) controlled, as components of BEMS
- Lighting, HVAC (e.g. water heaters), electrical appliances, white goods (washing machines, dishwashers, clothes dryers, fridges, ovens, ...)
- Others? Cars (EV)?
- Specific EupP (Energy using and producing Products)
- Main issue: Optimise their operation by taking care of
 - Usage profiles & comfort needs
 - Energy availability and prices

- **Key issue is improving Demand Side Management (DSM)**

- Reducing global energy consumption
- Reducing energy demand (from the grid) at peak periods

by placing the **well-informed consumer at the heart of the decision process**, with the support from intelligent Building Energy Management Systems (BEMS)

→ Active consumers

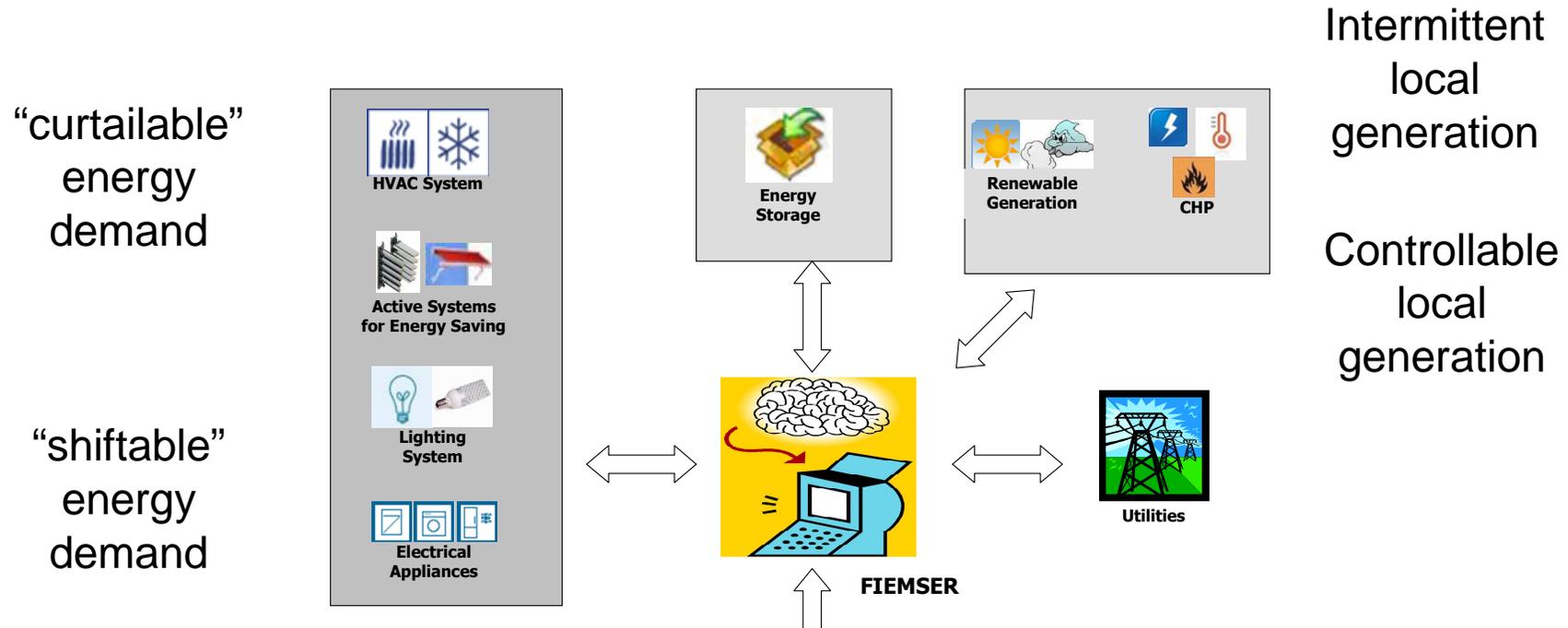
→ Intelligent Demand Response Solutions for load management



Demand-Response (DR)

- **End-user should be able to control (increase / reduce / postpone) some of his/her usages of energy in function of:**
 - His/her needs
 - Information received about dynamic energy pricing potentially including:
 - Production costs
 - Transport & distribution costs
 - Modulation factor according to chosen DR strategy
 - Production of local RES (e.g. PV cells) - depending on sunshine conditions
- **Exchange of information need cross-system integration / interoperability **within smart buildings & smart cities (among interconnected smart nodes – at different scales)****
- **Innovative BEMS can provide support for optimal control & decision-making**

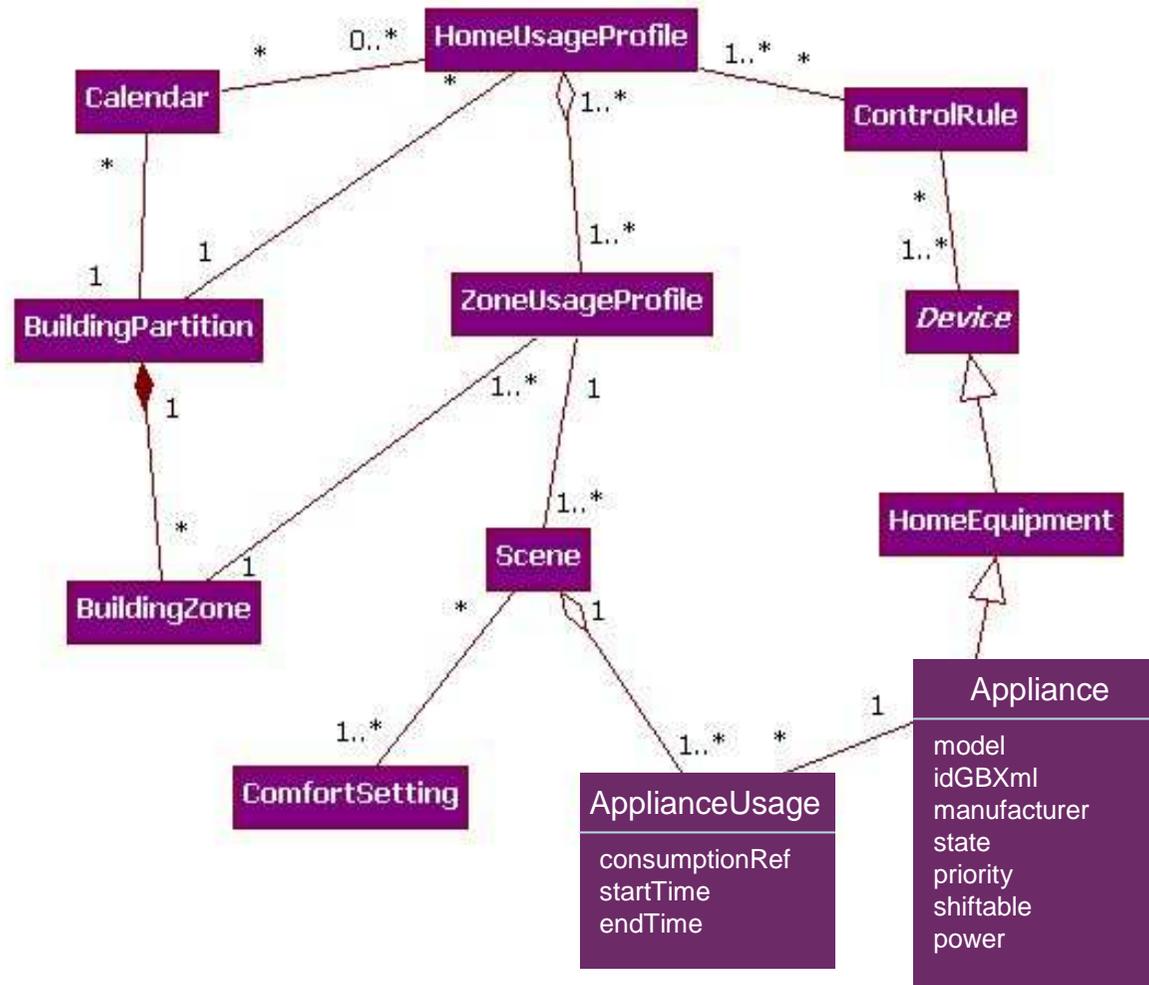
Example of FIEMSER project



Optimize the energy consumption and local generation according to the chosen strategy (e.g. minimize the energy demand from the grid) through a dynamic scheduling of resources, based on:

- *predictive energy demand integrating user activities/preferences and weather forecast*
- *dynamic hourly energy prices*

FIEMSER – User Preferences sub-model



*Simplified
UML
diagram*

Standardisation for “smart appliances”

- **Why?**
 - “Plug-and-Play” integration of smart appliances/devices from different manufacturers
 - Interoperability between heterogeneous systems, allowing holistic energy management
 - Seamless integration across the Smart Grid ecosystem
 - “standardized” communication between utilities and home energy systems
 - Fostering open & competitive market, new & high-performing products
- **What?**
 - High-level (semantic) modelling of information to be exchanged (API-like) – 1st step: common vocabulary
 - Integration layer “above” communication protocols (KNX, ModBus, Ocean, etc.) that will continue to co-exist in the future
 - Integration with BIM (Building Information Model)

ICT4EEB roadmaps

Finished

- **REEB: The European strategic research roadmap to ICT enabled energy efficiency in buildings and construction (www.ict-reeb.eu)**

Results: Vision + SRA + IAP

Partners: CSTB, VTT, CEA, Labein, Acciona, Arup, UC Cork, TU Dresden

Duration: May 2008 – Oct 2010

Finished

- **REViSITE: Roadmap Enabling Vision and Strategy for ICT-enabled Energy Efficiency (www.revisite.eu)**

Results: Common ICT priorities for grids, manufacturing, construction and lighting

Partners: Loughborough Univ., VTT (+Aalto), CSTB, KEMA, Intel, FhG-IPK, Innova

Duration: Feb 2010 – April 2012

On-going

- **ICT4E2B FORUM: European stakeholders forum crossing value and innovation chains to explore needs, challenges and opportunities in further research and integration of ICT systems for Energy Efficiency in Buildings (<http://www.ict4e2b.eu>)**

Results: Updated roadmap (based on REEB + E2B + ...)

Partners: D'Appolonia, Atos Origin, VTT, SAP, Schneider Electric, Mostostal Warszawa

Duration: Sept 2010 – Oct 2012

On-going

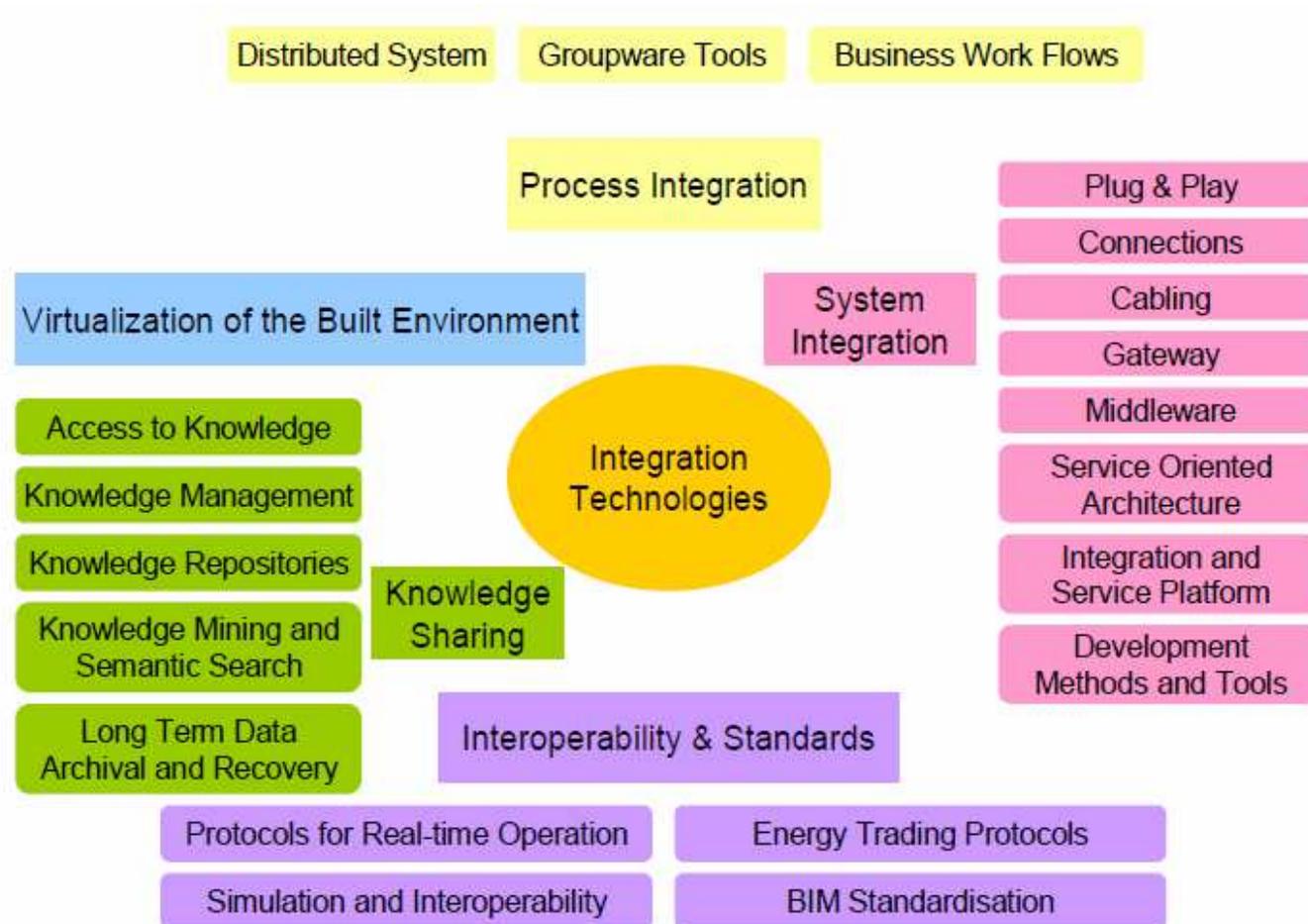
- **IREEN: ICT Roadmap for Energy-Efficient Neighbourhoods**

Results: RTD & Innovation roadmap

Partners: Manchester, CSTB, VTT, Atos Origin, Acciona, AIT, D'Appolonia, Amsterdam

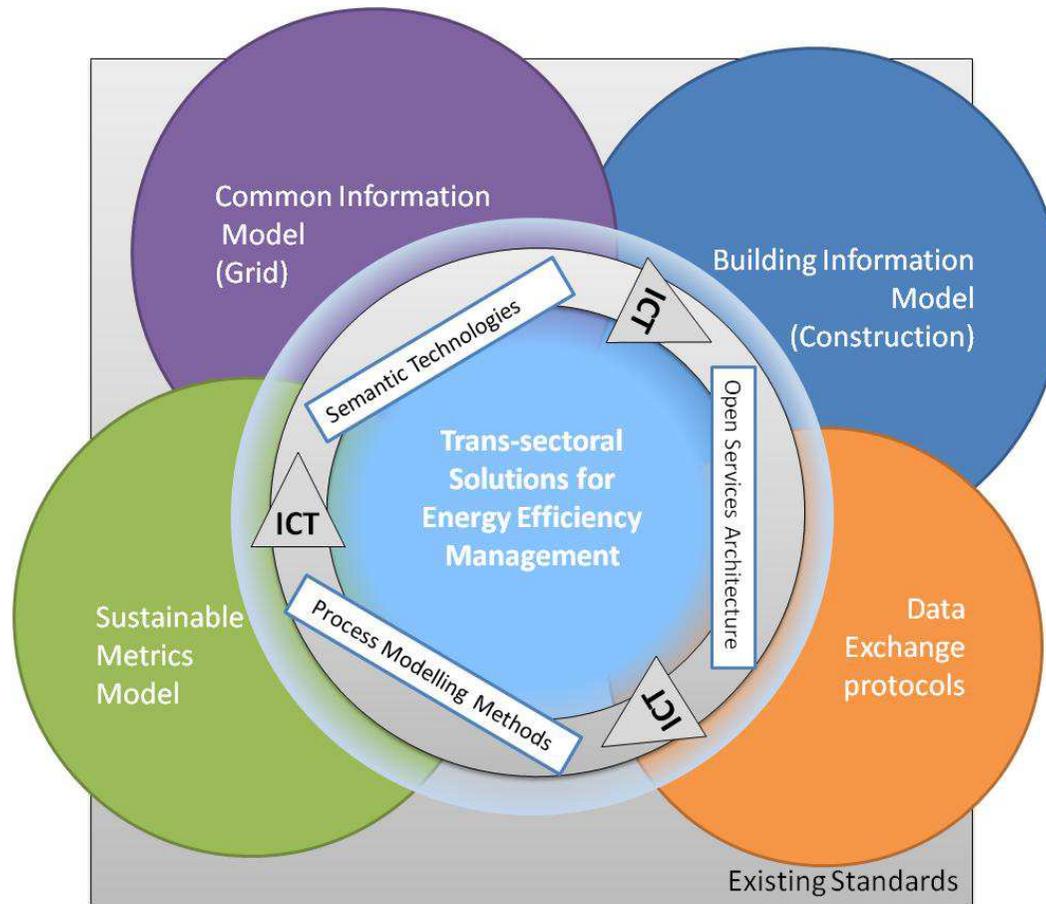
Duration: Sept 2011 – Aug 2013

Integration technologies



Source: ICT4E2B Forum Roadmap

Model convergence



Source: REViSITE Roadmap

Conclusion

- **Beyond new insulation or performing energy systems, new ICT-based services are to be developed to foster the deployment of DSM solutions thanks to Smart Grids development**
- **Selection or definition of relevant information models & communication protocols for exchange of semantic information between component “nodes”, adapted to the considered scales (i.e. Building / Neighbourhood / City)**
 - Management of the system complexity
 - Definition of “energy profile” (current consumption + forecast) for each node at each of the defined scales
- **Need to validate the real benefits of DSM solutions through experimentations by integrating technical & socio-economical viewpoints (e.g. Impact of users awareness on their behaviour)**
- **Also need to agree on a common evaluation methodology allowing objective benchmarking**