

An abstract sculpture made of light-colored wood, featuring a series of vertical poles and curved, overlapping planes that create a sense of movement and depth. The sculpture is set against a dark, textured background.

## Next steps for M2M standards: Abstraction & Semantics

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# Introduction



# Outline

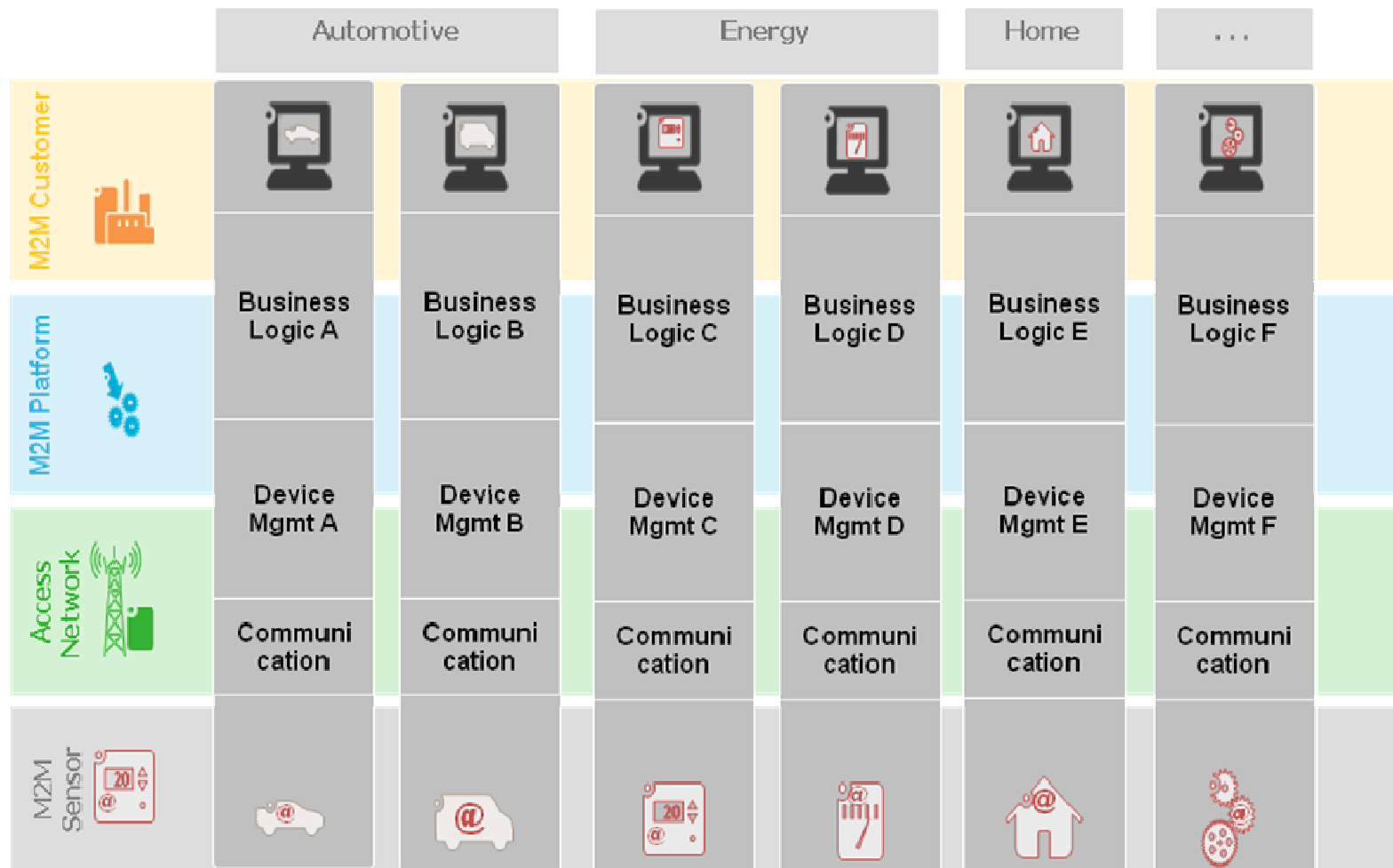
- 1 • Problem statement
  - From the real world
  - Use case for Abstraction
  - Use case for Semantics
- 2 • Who is doing what toward Abstraction / Semantics
- 3 • Conclusion



# 1. Problem Statement



# Vertical M2M Solutions - Today



# Example of AGORA

## French Home Networking Forum

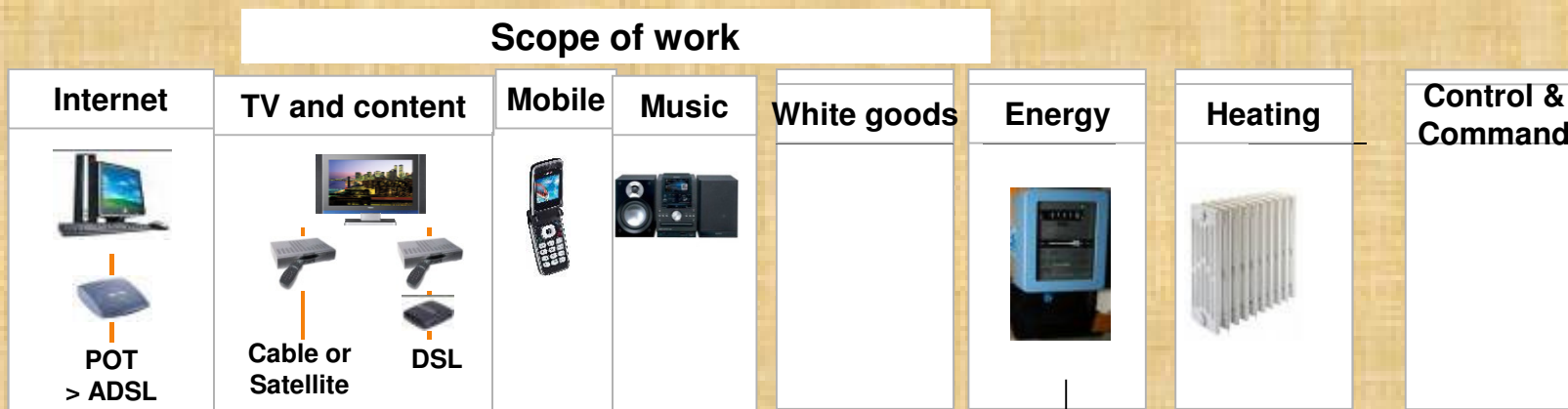
- **Today and tomorrow home services for what?**
  - Telco-multimedia, Home automation, Energy efficiency, Security, Safety, E-health passive & active, Day care... but with respect of personal data protection
- **Home Networking for what?**
  - Need to interconnect various types of devices to deliver new and heterogeneous services
  - Still multiple independent and waterproof silos

### Create an ecosystem

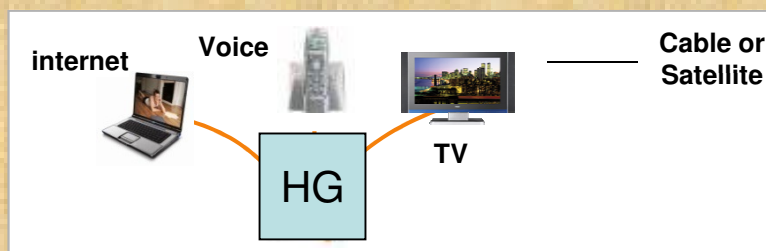
- Analyze the needs for a home network, architecture(s), protocol, middleware...
- Federate the national players first then international
- Define the platform
  - Reference relevant standards
  - Analyse and select the appropriate technical solution for **federating the home equipment between themselves, independently of their own connecting technologies** = the “**homebus**” concept

# From siloed environments to convergent services

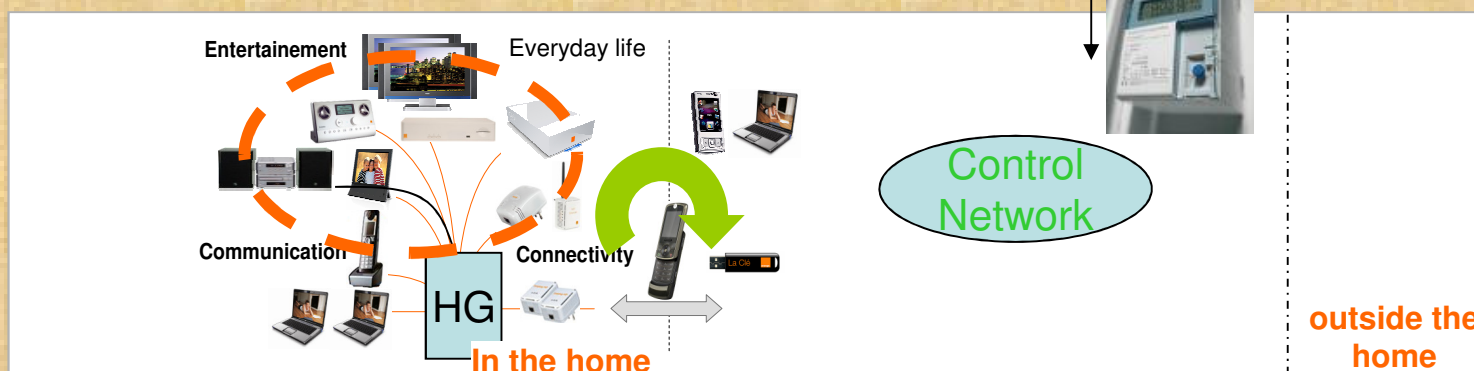
**1**  
Silos  
Between  
Services  
and  
networks



**2**  
Triple  
Play

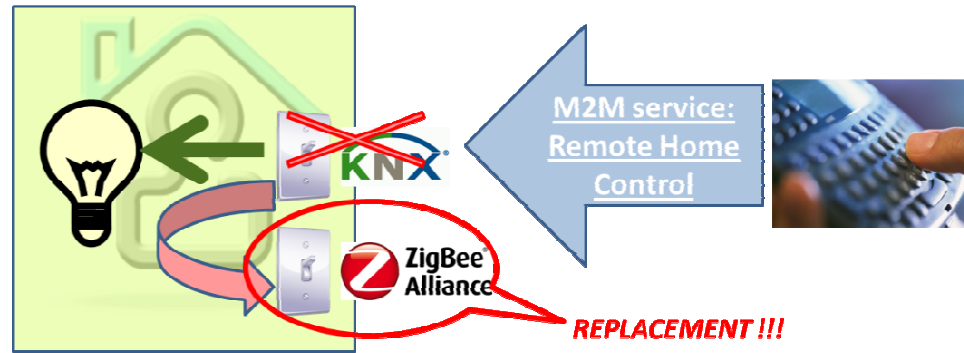


**3**  
Digital  
Home



# Use case – device abstraction

1. Service Provider offers Home Control service
2. Devices in home are replaced (e.g. by other technology)

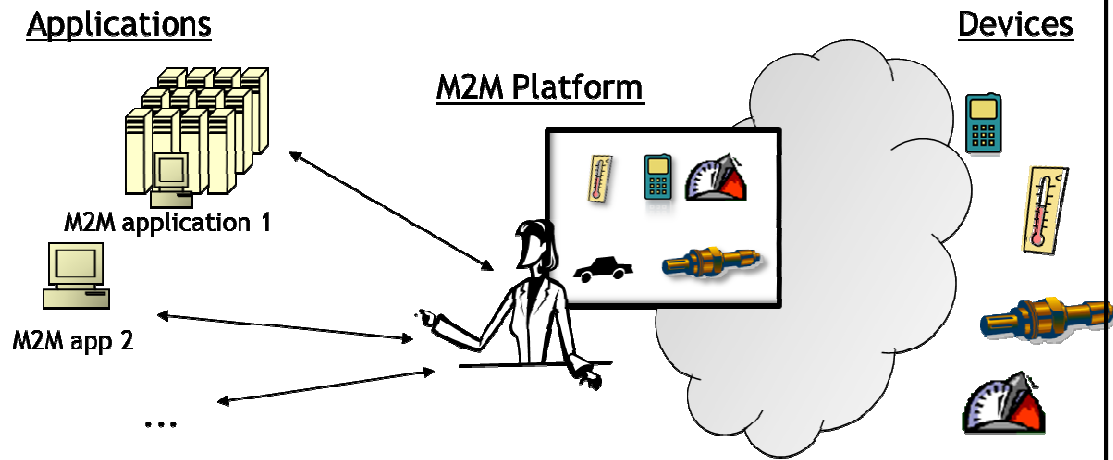


## Instead of manual re-configuration:

- M2M System finds out which device has been replaced (information on the **type** of device and how to **interface** it)
- M2M System offers an **Abstraction Layer** that decouples M2M applications from specific end device implementations
  - e.g. allows Home control Service to access a 'switch', not a KNX switch or ZigBee switch ('switch' interface is **abstracted** from specific technology)
  - ✓ ***Service becomes independent of (many specialized) technologies***
  - ✓ ***Big cost savings possible – less maintenance, no manual interaction !***



# Towards 'meaningful' M2M data



Information on the 'meaning' of M2M data:

- Enables an application to **find suitable M2M data / devices and use them** (if permitted);
- Makes it possible to create an **open market** for M2M data;
- Allows M2M providers to become intelligent **brokers** of M2M data

→ M2M needs to incorporate *information models* with *operations* and *relations*.

Next step: from "devices" to "things"

- M2M System supports information models not only of devices but of higher-level entities (IoT "things" **real-world entities** like "rooms", "cars", "persons" ...)
- Applications can **directly interact** with real-world entities ("lower the room temperature of room XYZ")

Device-Level



Give me the value of Temperature Sensor 543

Set actuator on Sensor 645 to „on“.

Set device 354 rotation to 45 degrees

Thing-Level



Give me the indoor temperature of the room.

Set the light level in the room to 15

**virtual representation of object/person/place in the real world**

# Missing link: “Semantic” in M2M

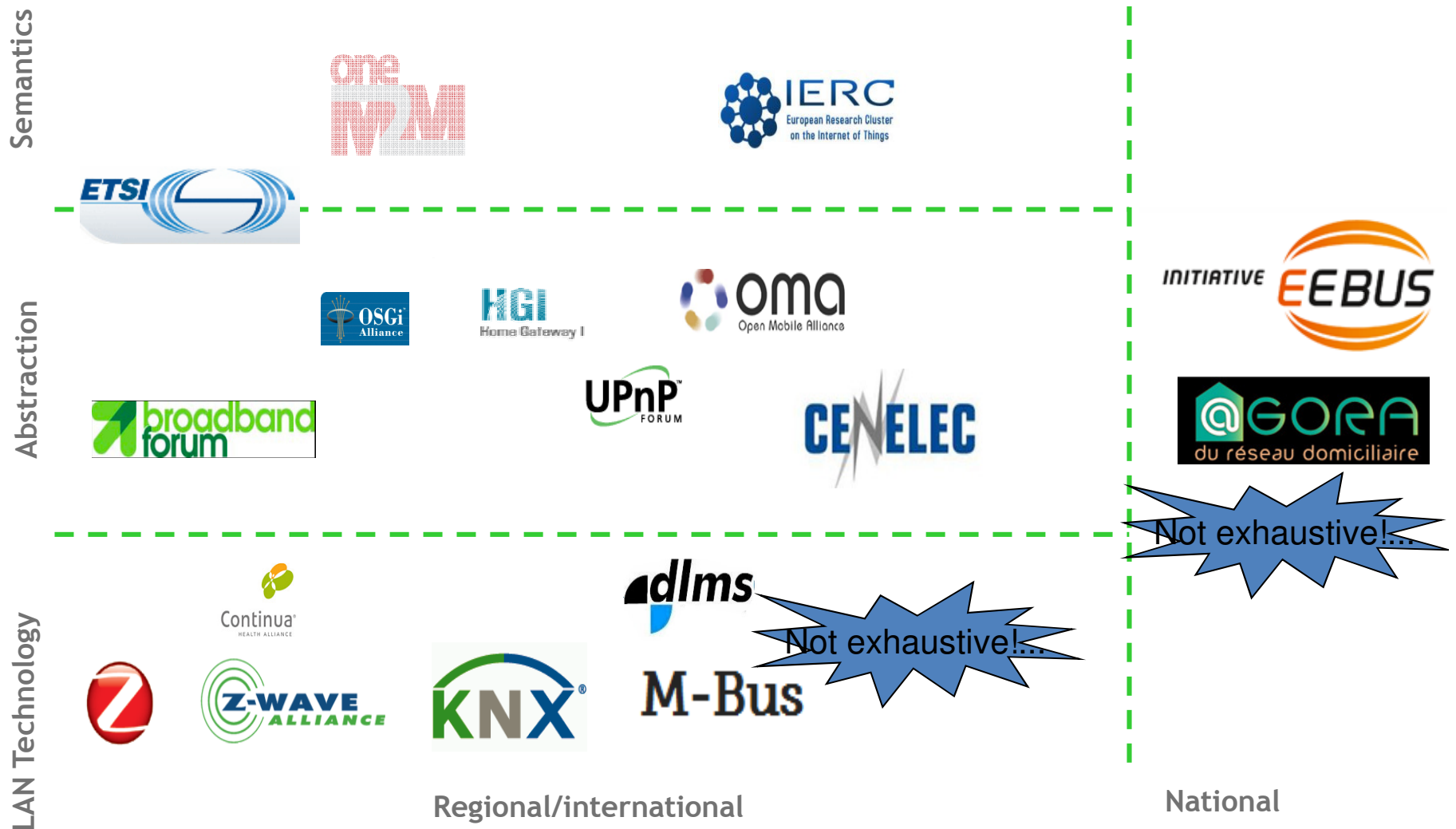
- “Semantic” in M2M = the capability to describe the **meaning** of M2M data (e.g. the purpose/type of a device) in a **machine interpretable** way in the M2M System.  
(information on **type** and **interface**)
- The semantics of specific M2M data can be **provided** by the **industry segment** that uses these data.  
(example: SDOs that are concerned with Home Automation)
- **M2M environment** should be able to **discover** M2M data based on their semantic description
- “Semantic” is essential if the M2M System is evolved to interact with **real world entities** (“things”)

## 2. Who is doing what towards Abstraction & Semantics?



# M2M (pre)-Standardization Landscape

## Abstraction and Semantics



# needed: A Framework of Standards

- By default M2M requires many standards to collaborate
- SDOs, who are independently working on similar semantic / abstraction goals are aiming to harmonize with each other (example: BBF, ETSI M2M, HGI, OSGI, OMA..)
  - Smart Home standardization workshop, 11th October 2012 in Berlin clearly showed
    - a barrier for the market caused by heterogeneous technologies and devices for Smart Home purposes
    - a common wish between participating SDOs representatives at this workshop (BBF, ETSI M2M, HGI,...) to collaborate on standardizing a coherent solution (in terms of Abstraction & Semantics) to overcome this barrier
- oneM2M, claiming end-to-end aspects of standardization, could play a coordinating role, while explicitly keeping out of the specifics of individual industry segments.

### 3. Conclusion



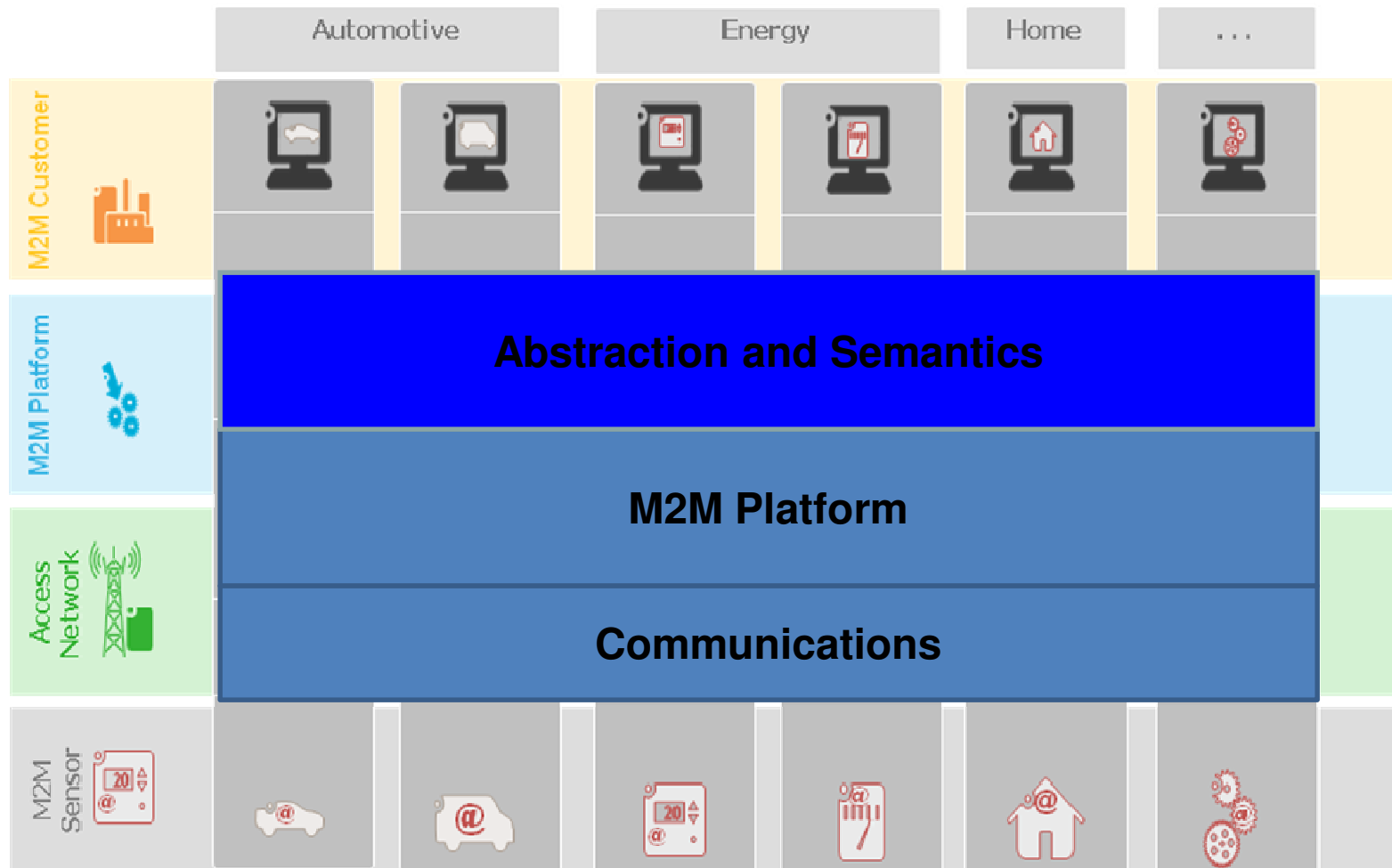
# Proposed way forward

## **oneM2M is best suited to take a coordinating role:**

- Propose some default way how syntactic and semantic information could be documented by vertical industries / SDOs
  - This will help to define abstraction layers, using the same format
  - It will ease the creation of interworking proxies in oneM2M
  - It will be extensible to be used for higher-layer M2M objects (“Things”)
- Make use of experiences of the IoT research community where similar questions have been discussed since a long time.
- Offer help (create some best practices) how vertical industries / SDOs may technically interwork with oneM2M.
- Once agreement on abstraction layer and semantics has been achieved include references to the semantic descriptions in oneM2M specifications (to enable machine interpretation)

**Details of such coordinate should be discussed with all the stakeholders: HGI, BBF, OSGi, Verticals, OMA etc.**  
**Help from research projects is key**

# From vision to strategy

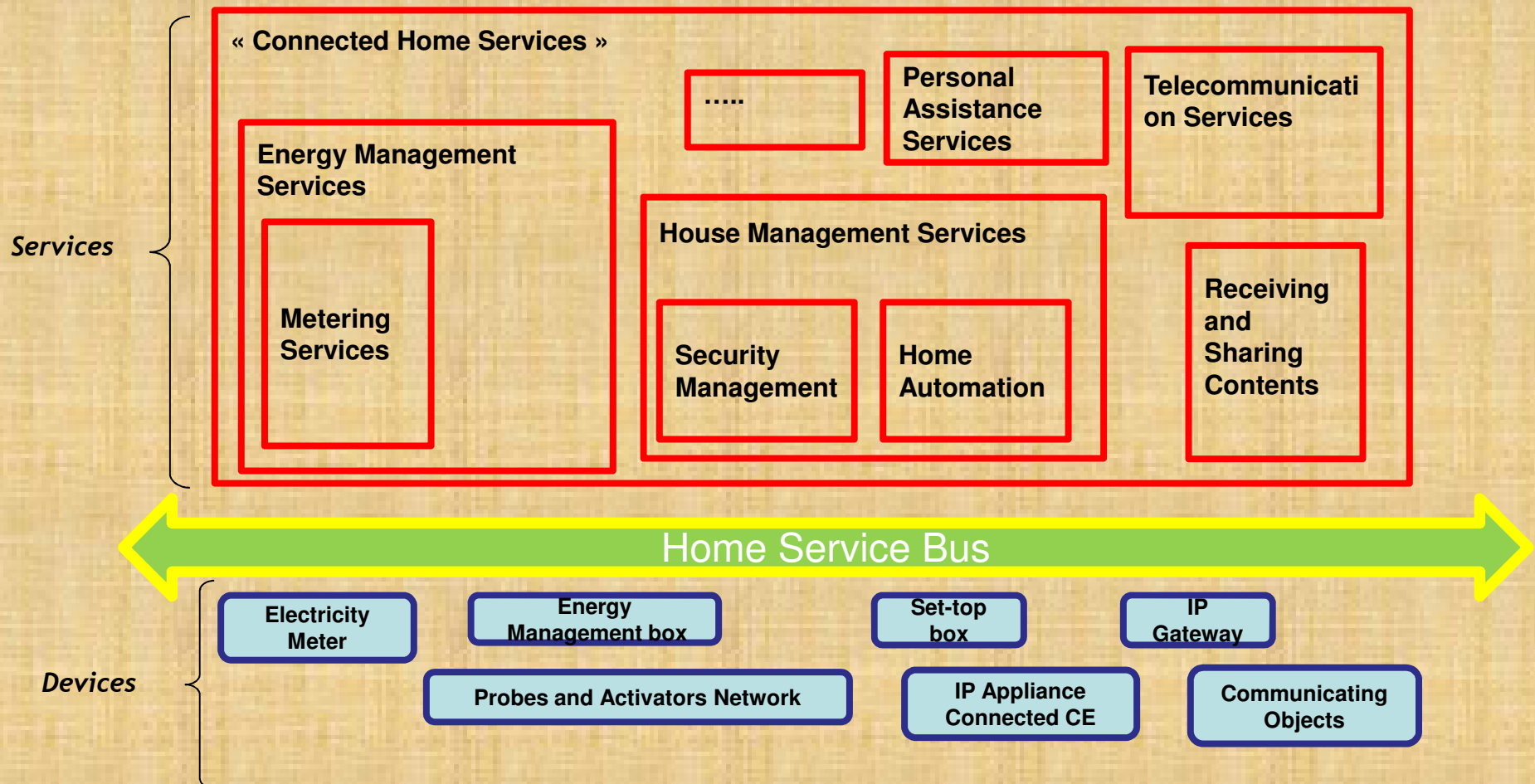




Backup

# Example of a Real need addressed at the national level → where international standards are expected

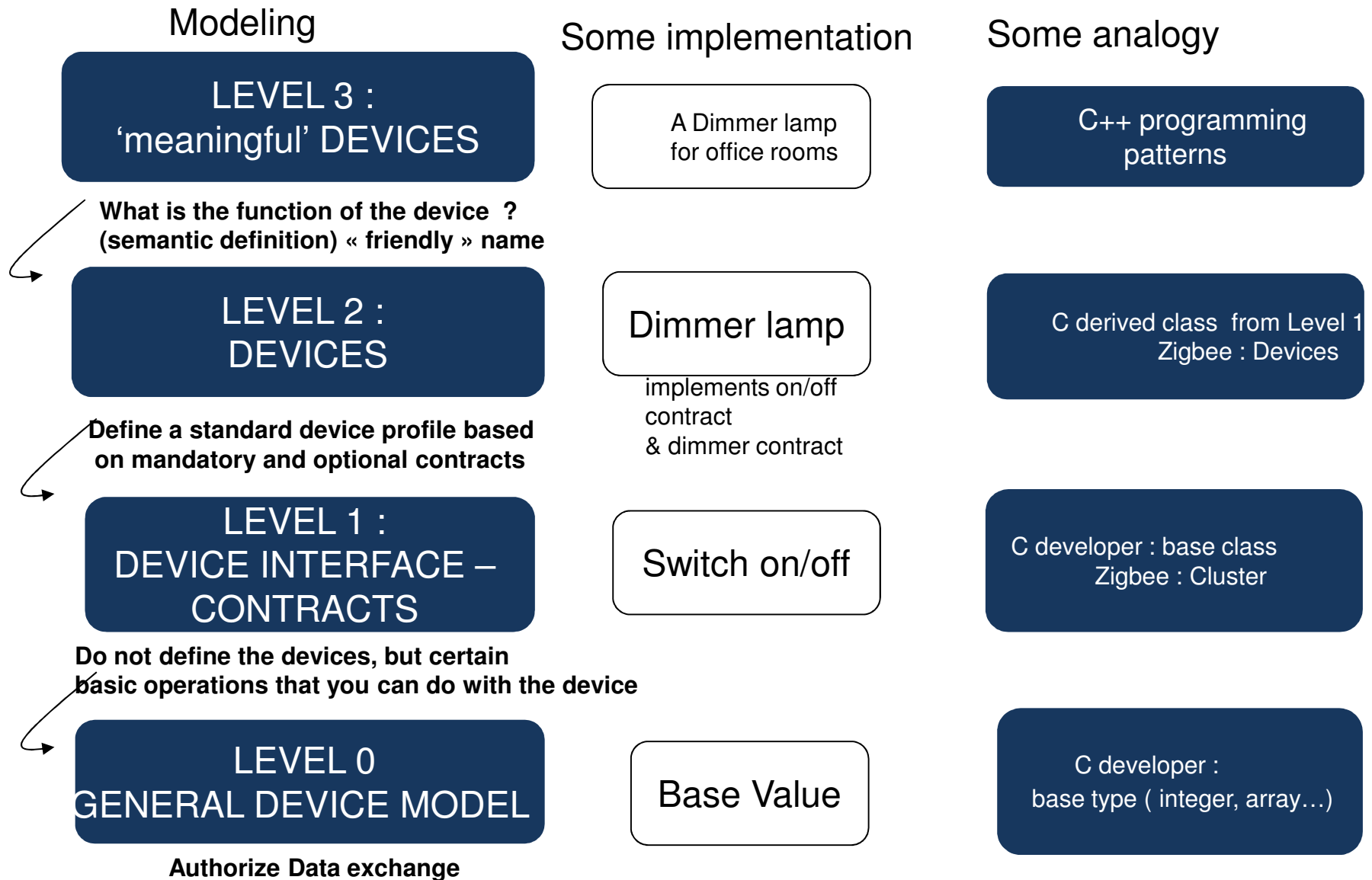
Agora example : defining a Home Service Bus (HSB)



- the HSB is the heart of the ecosystem
  - Abstracting the heterogeneity of LAN technologies and types of devices
- Standardization of interfaces is a key ingredient for success

# Different levels for Device Abstraction

Source: HGI01898 contribution from DT, Orange, Telecom Italia, Prosyst, SoftAtHome

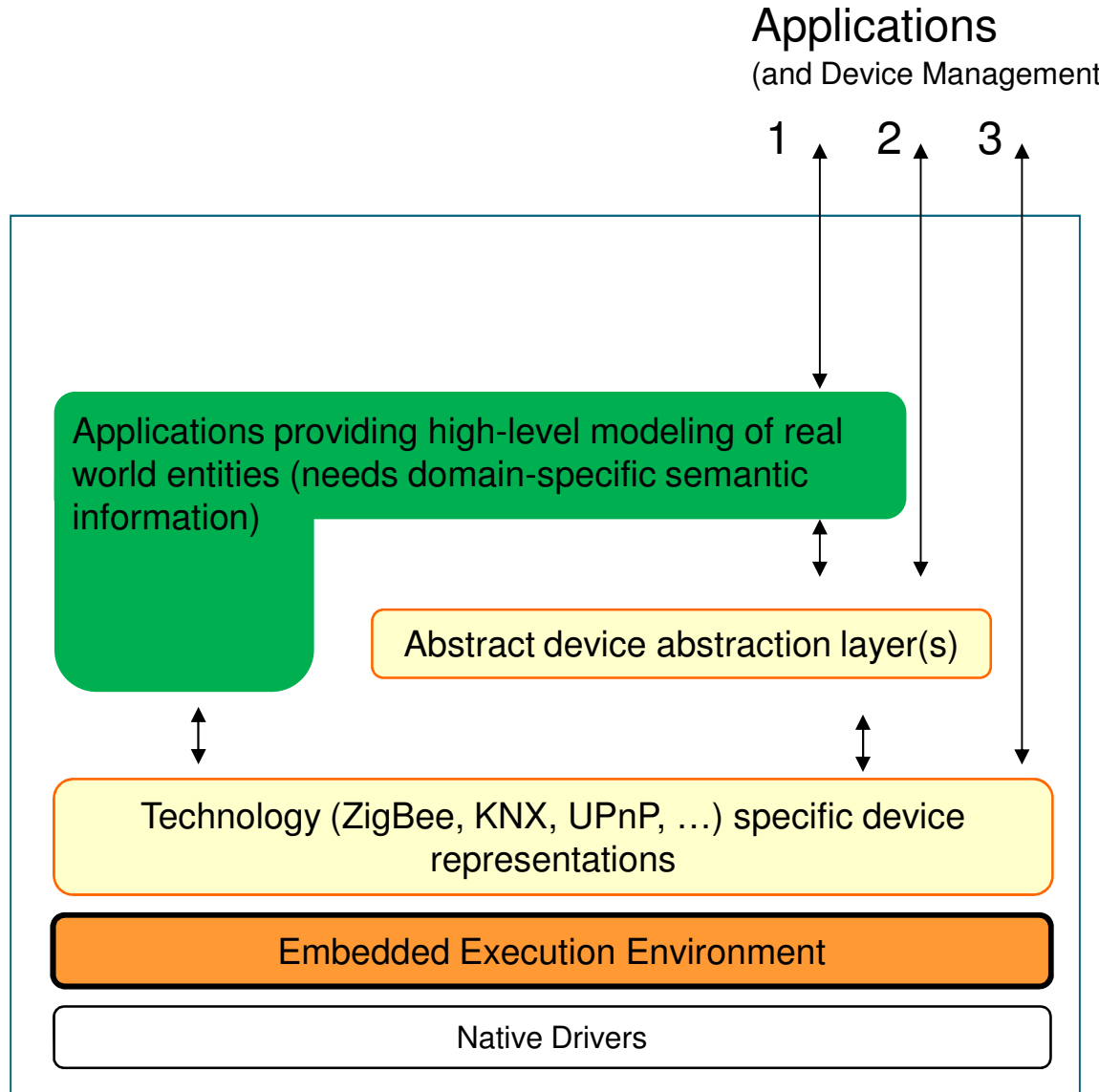


# 3 levels to represent embedded applications

Source: HGI01898 contribution from DT, Orange, Telecom Italia, Prosyst, SoftAtHome

changed

where international standards are expected:



## 1. Business-level application communication

e.g., "decrease the overall energy consumption with 500kW"

## 2. (Abstract) device communication

e.g., "switch off the radiator with ID=00003"

## 3. Techno-specific device communication

e.g., "send the command <ZigBee Specific Command> to endpoint ID=<ZigBee specific ID>"