domOS

OPERATING SYSTEM FOR SMART SERVICES IN BUILDINGS

The domOS Project

Sustainable Places 2020

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Facts & Figures

- Type **Innovation Action (IA)**
- Call **LC-SC3-EE-4-2019-2020**

  Upgrading smartness of existing buildings through innovations for legacy equipment
- Partners **11**

  3 SMEs, 1 multinational company, 2 start-ups, 2 regional energy grid operators, 2 universities, 1 not-for-profit research centre
- Dates **Sep. 2’020 – Aug. 2’023**
- Budget **4.973 M€**

Observations

- **Plenty of smart products / services for buildings are available** on the market and deployed by building owners, tenants or facility operators

  - Smart watering system, on-line heat-pump, security & alarming solutions, on-line photovoltaic inverter, light bulbs , coffee machine…

Silo solutions!

Observations

- Why can the deployment of such smart products / services become a problem?
  - **Lack of integration**:
    - Multiple gateways, sensors, in-house communication networks, applications, management procedures, access control schemes…
    - No single point of access
  - **Deployment of cross product / service solutions are impossible or highly complex**
    - Energy management requires the choreography of the photovoltaic inverter, the grid, the battery, the heat pump, the blinds, the lighting…
    - A security service could make use of the electrical load curve, of the blind control system…

Why is Reaching Interoperability Complex

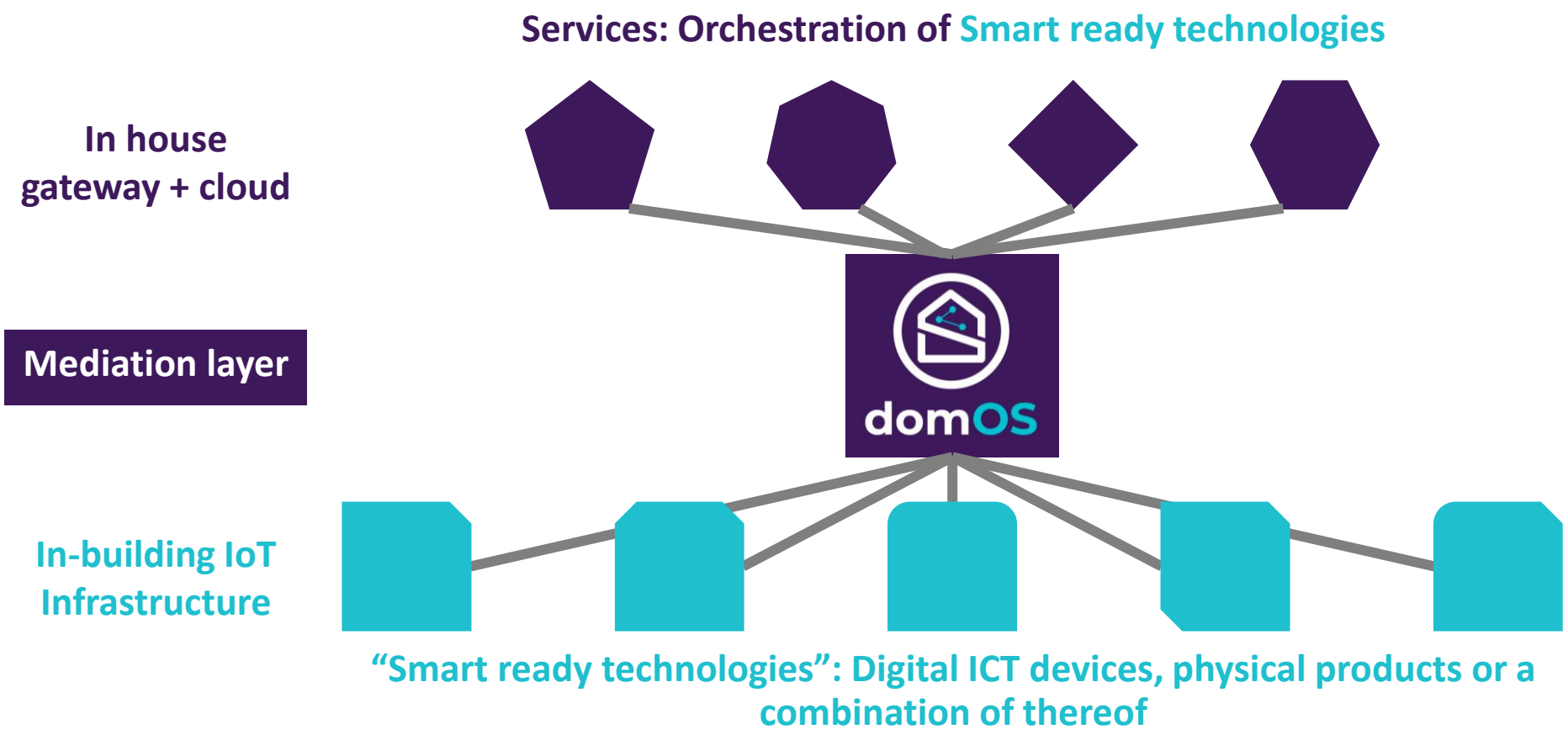
- Interests between stakeholders are many, and sometimes conflicting
- The smart building domain is a domain open to competition
  - No de jure authority

Source: https://imgs.xkcd.com/comics/standards.png

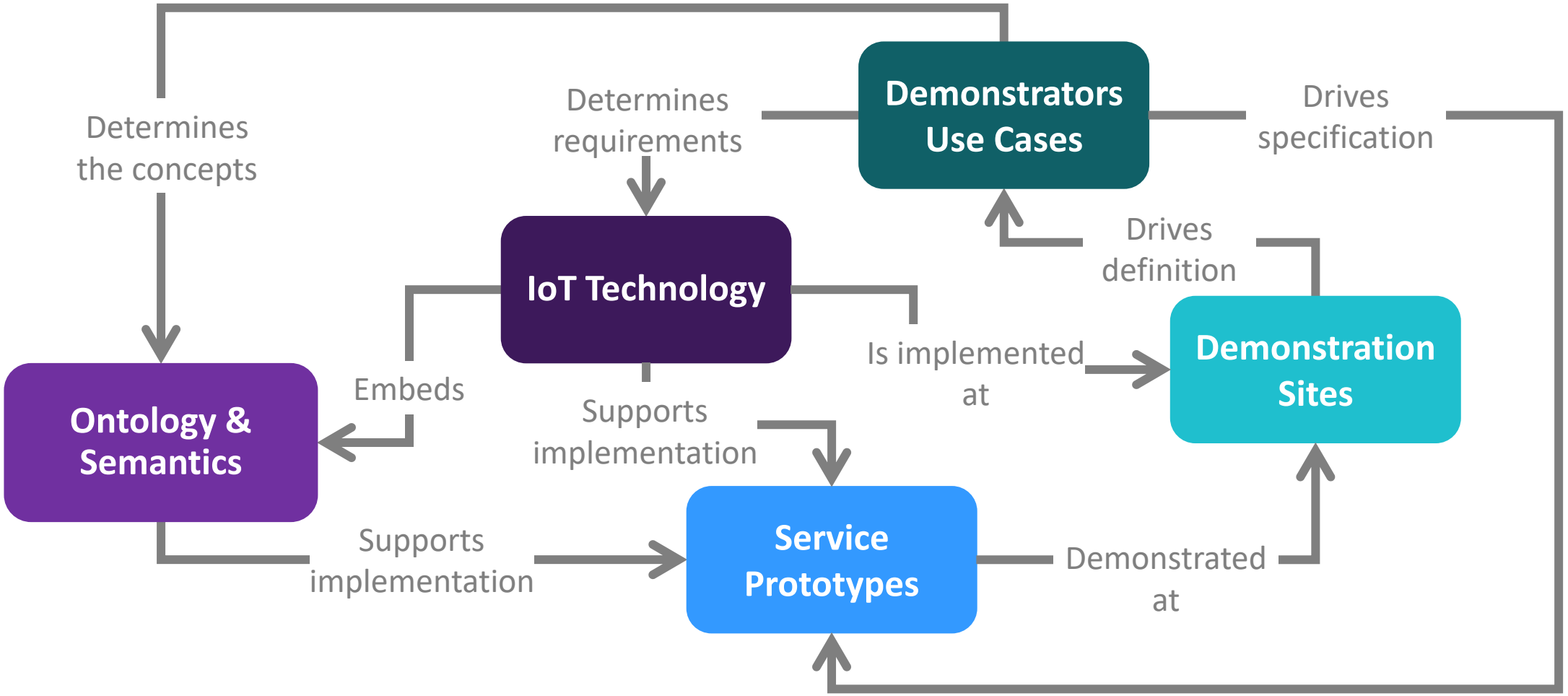
- The main difficulty is not technical, but organisational
- Be careful: Interoperability requirements can slow down innovation

domOS Vision

- Become an **Operating System** for **Buildings**



Workflow


Determines the concepts
Determines requirements
Demonstrators Use Cases
Drives specification
Drives definition
IoT Technology
Is implemented at
Demonstration Sites
Embeds
Supports implementation
Ontology & Semantics
Supports implementation
Service Prototypes
Demonstrated at

Demonstration Sites

- **Smart Services for Electrical Energy**
  - Paris (F)
  - Sion (CH)

Demonstration Sites

- **Smart Services for District Heating**
  - Aalborg (DK)
- **Smart Heat Generation Control**
  - Skive (DK)
  - Neuchâtel (CH)

Service Prototypes

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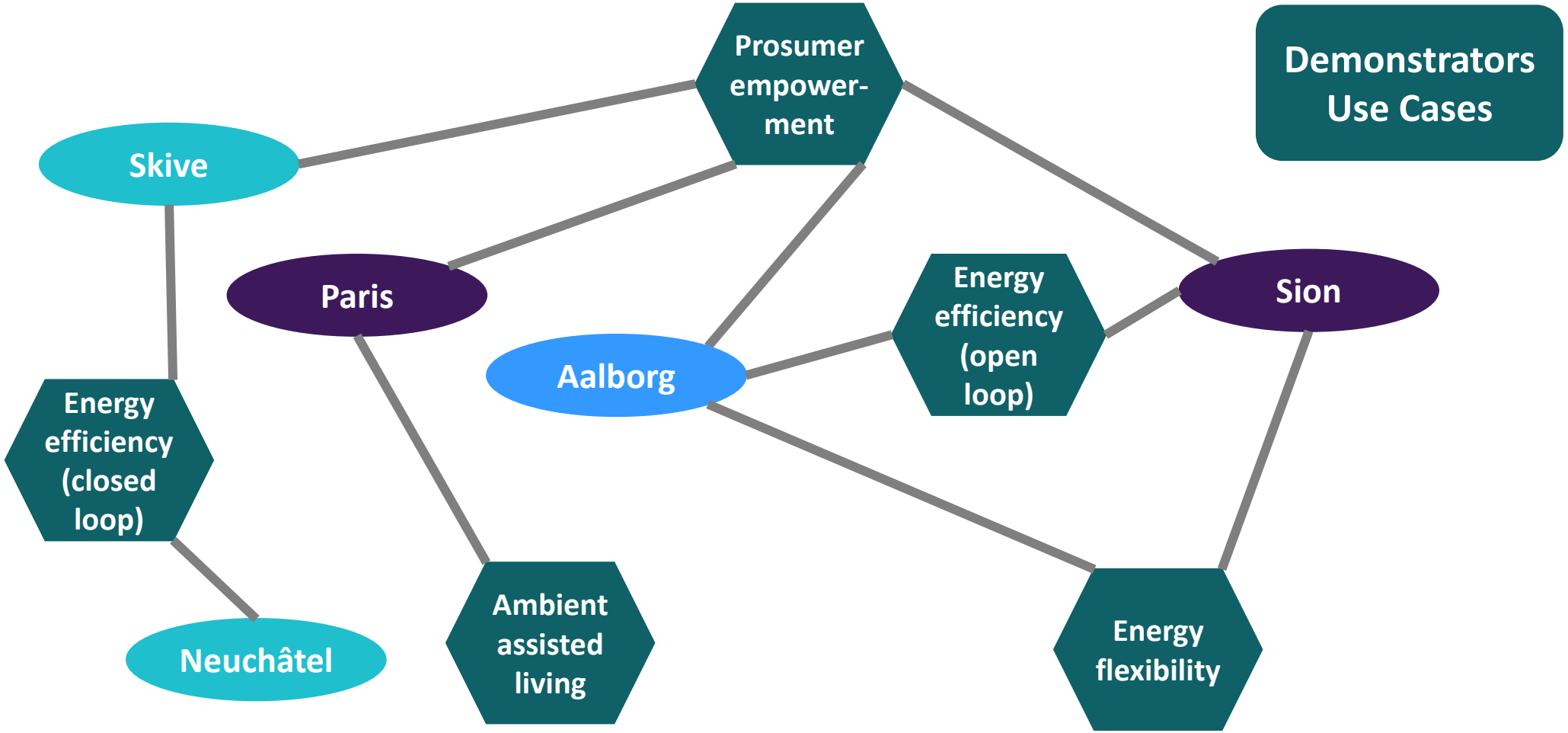
- **Energy flexibility**
  - Integration into electrical grids
  - Peak shaving for district heating
  - Maximisation of self-consumption
- **Closed-loop control for energy efficiency**
  - Minimisation of the temperature of the fluid in the in-building heat distribution circuit
- **Open-loop control for energy efficiency**
  - Analysis of the performance of heating systems
- **Prosumer empowerment**
  - Dashboard service for building occupants
  - Automated coaching on energy consumption
- **Non-energy services, Ambient Assisted Living (AAL)**
  - Warning service based on detection of behaviour deviation for elderly people

Service Prototypes

Mostly residential buildings

Demonstrators Use Cases



IoT Technology

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- **IoT technologies are varied**
  - This will remain
- Vision: **Applications** dispose of:
  - a **coherent access to information elements** in the field
    - Measurements, set points, configuration, status
  - a **coherent access control mechanism**, and
    - Identification for applications
  - a **coherent privacy control mechanism**
    - What application may access what information element

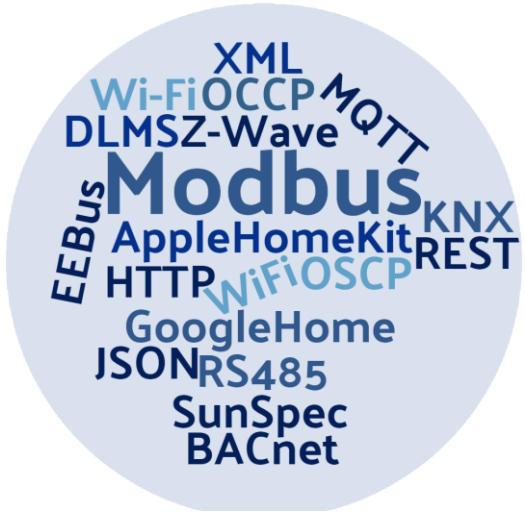
Approach: *Describe* the IoT access mechanisms, *don't change* them

IoT Technology

W3C®

WEB OF THINGS

WoT Thing Description



Ontology & Semantics

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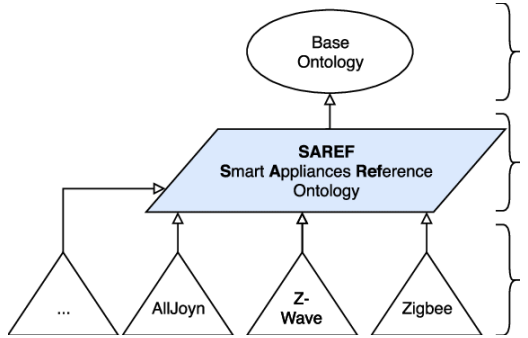
- IoT technologies provide a technical and syntactic interoperability
  - But no **semantic interoperability**

Semantic interoperability: Give the same name to the same thing

Ontology & Semantics

SPINE



- Still required: a **common nomenclature** (ontology) shared by IoT technologies and Services
  - W3C WoT Things Description supports *any* ontology

Approach: Test and propose updates to existing ontologies

FlexOffer
flexoffer-community.eu

www.domos-project.eu

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