PROJECT:
ICT Platform for Holistic Energy Efficiency Simulation and Lifecycle Management Of Public Use Facilities

HESMOS Virtual Energy Lab

DELIVERABLE TITLE:
Ontology specification for model-based ICT system integration

Deliverable Number:
D 4.1 (public)

WORK PLAN:
The **objective** of WP4 "Model-based ICT system integration and intelligent access services" is to close the gap between building information models and building automation systems. As a bridge between these two worlds, an ontology is used which is the core of this deliverable. Other goals of WP4 are (1) development of intelligent access services for easy energy-relevant evaluation of monitored data, (2) development of an engineering query language which allows user-friendly formulation of energy-related tasks and (3) definition of usage scenarios for the engineering query language.

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EXECUTIVE SUMMARY:
Architectural building models and models of building automation systems are generated by different companies nowadays and with incompatible software. Until now, architects have not been interested in details of building automations systems. Building automation systems are designed when the main work of the architects is already finished and the building starts to be constructed.

In HESMOS things change since not only the design phase is of interest but also the **operation phase** as well as **refurbishments**. The proposals for refurbishments are intended to be based on **comparisons** between the energy-efficiency of **different solutions**. The energy-efficiency of these solutions can only be found by simulations. But, simulation models are not very exact if there is no validation of the simulation parameters. In the refurbishment phase, the sensor data of the building (monitoring data) can be used to compare the simulations of the current building state with the reality. The results of this comparison are used to improve the simulation model to be as close as possible to the reality.

The missing link between building automation systems and the building model of the architects hampers the simple comparison of simulations and measurements. Because of this, the goal of HESMOS work package four is to **close the gap between the building model (the eeBIM) and the BAS model**. This will be realized with the help of an ontology which is the subject of this deliverable.

The second motivation for the ontology of this document is that architects and energy evaluators are often not familiar with building automation

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systems and their ICT-oriented structure. People who are familiar both with architecture tools and building automation systems tools are rare. It is the goal of the ontology to set the end users free of dealing with building automation systems. End users should only select rooms and physical quantities like temperature or room air quality which they want to evaluate. The ontology as the backbone allows selecting the appropriate BAS devices which deliver the desired values.

There is a fact which complicates the integration of eeBIM and BAS model: There are many different kinds of building automation systems. The most famous ones are the open systems LON, BACnet and KNX as well as the emerging wireless technologies ZigBee and EnOcean. Since these technologies differ in details, an integration approach should be applicable for **all common building automation systems** and also for **future developments**.

Besides, it is intended to create the mapping between both worlds (BIM and BAS) as far as possible **automatically** for avoiding unnecessary human effort.

The deliverable report is structured into three parts:

In the **first part,** the motivation for the ontology is explained. The state of the art is analyzed and the goals of the new ontology are given. A short description of the software to be implemented which uses the ontology helps to understand the meaning of the ontology.

In the **second part**, details about the ontology are described. Beginning with an overview about the whole ontology, the components of the ontology are explained.

The **third part** deals with the mapping from the abstract ontology view to real-world BAS technologies like LON, BACnet or EnOcean.

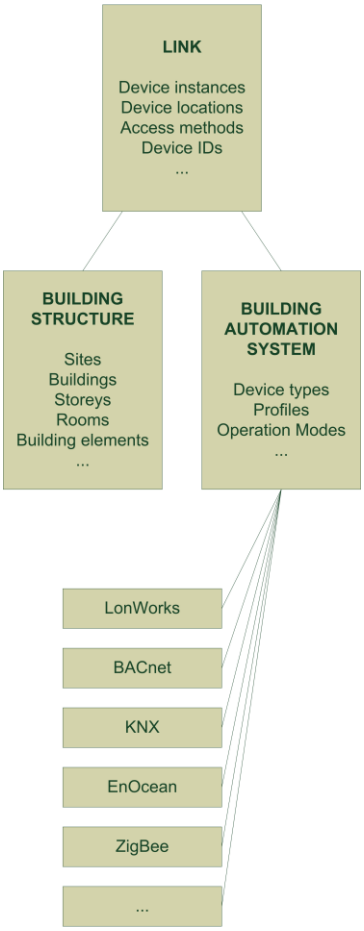

FIGURE: Overview of the ontology structure realizing the link between building structure and building automation systems

TAGS:
Energy-efficient building management, Ontology, Building Automation Services, Operation Phase

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