ISES

Intelligent Services for Energy-Efficient Design and Life Cycle Simulation

SEVENTH FRAMEWORK PROGRAMME

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SOFiSTiK Hellas, an SME located in Athens, is one of the main software developing partners in the ISES project. They are authors of this Newsletter together with the Institute of Construction Informatics at TU Dresden, Germany.

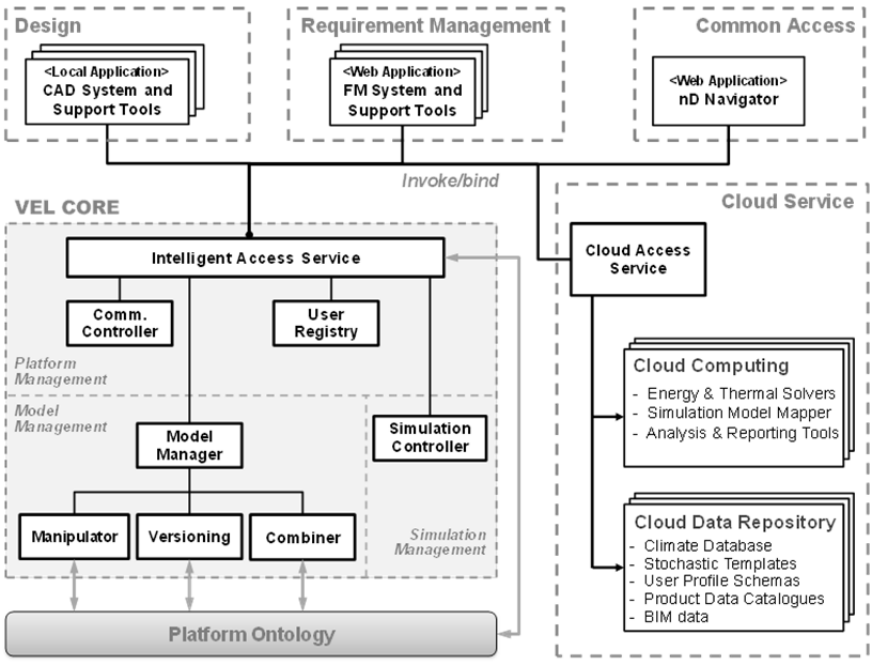
ISES is STREP project # 288819 funded by the EU under the 7th Framework Programme. The **objective** of the project is to develop ICT building blocks to integrate, complement and empower existing tools for design and operation management to a Virtual Energy Laboratory that will allow simulation, assessment and optimisation of the energy efficiency of built facilities and facility components in variations of real life scenarios before their realisation, acknowledging the stochastic nature of the involved information resources.

In this issue, we present the software architecture of the ISES virtual energy laboratory (VEL) and the developed overall stochastic approach.

SOFTWARE ARCHITECTURE OF THE ISES VIRTUAL ENERGY LABORATORY

The software architecture of the ISES Virtual Energy Lab (VEL) platform implements the SOA concept, following a general modular approach. It comprises several types of services and applications, bound together by a common *Core* module that acts as the middleware providing the required data and functional interoperability. All other components of the targeted VEL prototype are consistent with the identified use cases and can easily be extended in future. These are:

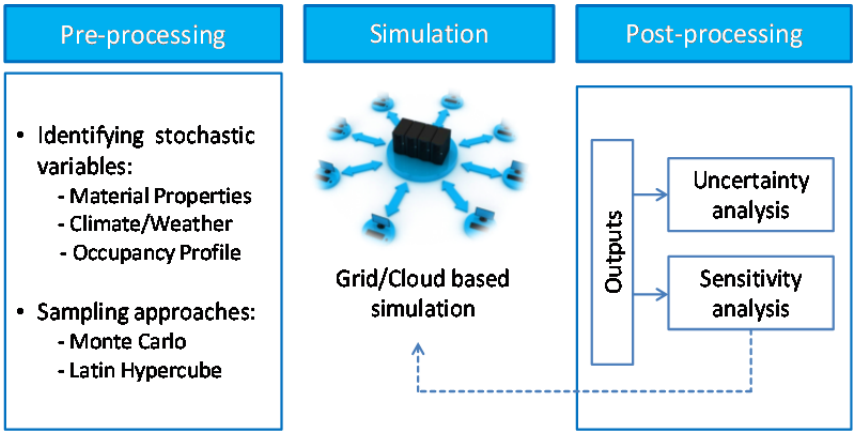
1) *Design module*, comprising a BIM-based CAD system, a product catalogue module for the selection and testing of new products and supporting tools capable to produce and export IFC model data (main users are architects and other building designers as well as product developers).
2) *Requirement management module*, comprising a FM system and related energy and costing tools (main users are facility managers and operators).
3) *Common access module*, providing a general-purpose interface to the VEL via a web application and enabling light-weight easy-to-do studies of building performance with regard to energy and life cycle costs (users of this component are decision-makers but also all other identified actors).
4) *Cloud Service*, providing energy related analysis and simulation services and tools, a simulation model configurator for simultaneous alternative simulations of stochastic values and reporting tools for the generation of various kinds of aggregated reports for decision makers. It will also provide access to several distributed information resources like product data catalogues, climate databases, stored stochastic templates and user profiles as well as BIM data.



Software architecture of the ISES Virtual Energy Laboratory

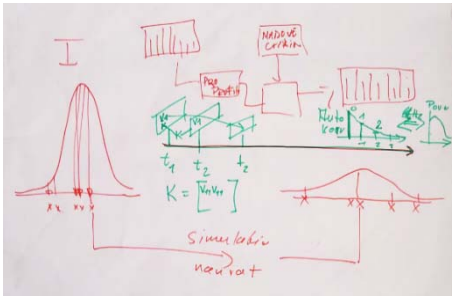
STOCHASTIC APPROACH

ISES aims to improve the energy efficiency of buildings by taking into account the *stochasticity* involved in the envisaged energy, emissions and cost simulations during the product life-cycle. The stochastic simulation is divided into the three phases:
(1) Pre-processing
(2) Simulation
(3) Post-processing.



The principal stochastic approach of ISES

Identification of the applicable stochastic variables, their ranges and scope, appropriate probability distribution function and identification of the appropriate sampling methods are conducted during the pre-processing phase. Stochastic issues are considered primarily with regard to climate/weather data and the user behaviour and occupancy profiles. Once the model evaluations have been performed, during the post-simulation step all results from multiple simulations are collected and an uncertainty analysis will be performed. To minimize the number of stochastic variables, before the uncertainty analysis a sensitivity analysis will be carried out. Since, despite the use of Cloud Computing, energy simulation itself remains an expensive computing process, finding the proper sampling approach and the optimal sample numbers are of very high importance. This is a major research challenge ISES is going to deal with.



Flipchart from the lively discussions

ISES CONSORTIUM

The ISES Consortium comprises four industry partners, two research organisations and two universities.

- TECHNISCHE UNIVERSITÄT DRESDEN, Germany (Coordinator)
- GRANLUND, Finland
- UNIVERZA V LJUBLJANI, Slovenia
- NYSKOPUNARMIDSTOD ISLANDS, Iceland
- SOFISTIK HELLAS, Greece
- NATIONAL OBSERVATORY OF ATHENS, Greece
- LEONHARDT ANDRÄ UND PARTNER BERATENDE INGENIEURE, Germany
- TRIMO INZENIRING IN PROIZVODNJA MONTAZNIH OBJEKTOV, Slovenia

The Fourth ISES Meeting took place in Athens on 9-10.10.2012 The meeting location was near the Acropolis, which allowed the participants to have a nice view of the site through the meeting room windows in the late evening session on the first day

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