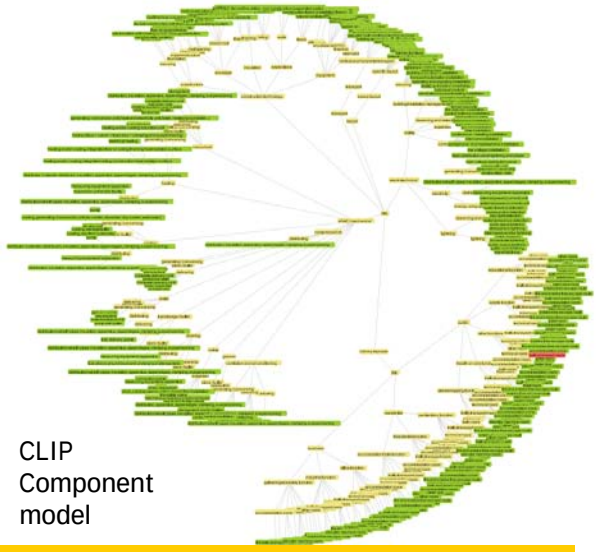
Lifecycle Building Performance Integration

RESEARCH SCHOOL
INTEGRAL DESIGN OF STRUCTURES

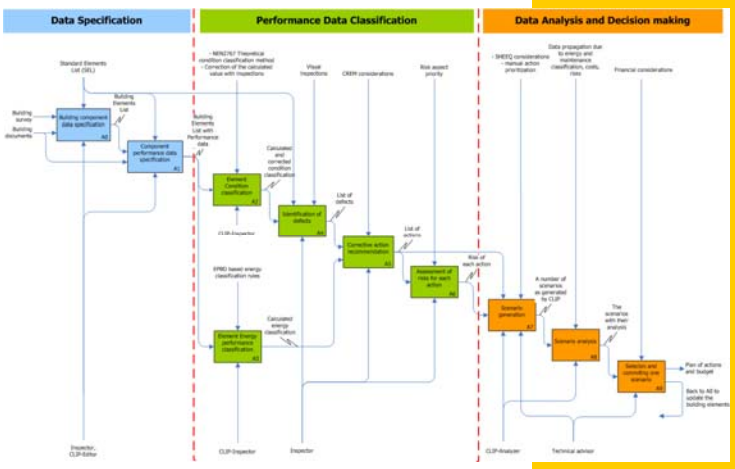
Speerpunt BOUW

Computational Support for Lifecycle Integral Performance Assessment of Buildings

Subject:
Lifecycle building performance assessment ensures that buildings perform and operate as intended. These assessment activities are multi-phase and multi-disciplinary, generating large amounts of information that needs efficient management. Multiple assessment methods are employed semi-concurrently and with a great deal of information overlap between successive phases. Usage of separate and disconnected tools for each method results in information fragmentation and redundancy, posing problems for well-informed decision making.



CLIP Component model



CLIP EPI-CREM Function model

Goals:
- Develop a generic *reference* model, CLIP (Computational support for Lifecycle Integral Performance assessment), that improves the efficiency and quality of existing performance assessment practices. CLIP addresses the basic assessment functionalities, and allows additional local functionalities, information content and types incrementally added as required. The model provides flexible, modular and extensible data structures and algorithms for the representation, transformation, integration and visualization of performance information.

Expected Results:
-An in-depth analysis of the existing LBPA methods and computational tools
-A computational reference model and software tool in support of LBPA
-The evaluation of the model with 2 test cases;
- Carnegie Mellon University Facility Management Services, Pittsburgh USA
- Dutch Government Building Agency (Rgd) EPI-CREM project

Apeldoorn Belastingdienst

3TU.

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Host University	TU Delft / Faculty of Architecture

TU Delft

Lifecycle Building Performance Integration

Computational Support for Lifecycle Building Performance assessment

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Subject

Lifecycle building performance assessment (LBPA) ensures that buildings perform and operate as intended. These activities are multi-phase and multi-disciplinary, generating large amounts of information that needs efficient management. Multiple assessment methods are employed semi-concurrently and with a great deal of information overlap between successive phases. Usage of separate and disconnected tools results in fragmentation and redundancy, posing problems for well-informed decision making. Such inefficiencies need to be resolved with computational support.

Goals

We developed an integral *reference* model, CLIP (Computational support for Lifecycle Integral Performance assessment), that aims to improve the efficiency and quality of existing performance assessment practices. CLIP addresses the basic assessment functionalities, and allows additional local functionalities, information content and types incrementally added as required. As such, the model provides flexible, modular and extensible data structures and algorithms for the representation, transformation, integration and visualization of performance information.

Research Question

What are the computational solutions that can lend support to the existing LBPA processes?

Strategy

- Domain analysis and model development through case studies and action research
    - Carnegie Mellon University Facility Management Services, Pittsburgh USA
    - Dutch Government Building Agency (Rgd) EPI-CREM project
- Model evaluation

Expected Results

- An in-depth analysis of the existing LBPA methods and computational tools
- A computational reference model and software tool in support of LBPA
- The evaluation of the model with 2 test cases

Preferred Partners Applications / Sponsors

This research is partly funded by the Dutch Government Building Agency (Rijksgebouwendienst), and extended towards an extension software development project based upon the model developed for the EPI-CREM project. For details, see http://www.epi-crem.org

Prime Publication / Prototyping

GÜRSEL, I., SARIYILDIZ, I. S., AKIN, Ö. & STOUFFS, R. (2009) Modeling and Visualization of Lifecycle Building Performance Assessment. *Advanced Engineering Informatics,* 23**,** 396-417.
GÜRSEL, I., SARIYILDIZ, I. S., STOUFFS, R. & AKIN, Ö. (2009) Contextual Ontology Support as External Knowledge Representation for Building Information Modeling. *CAAD Futures.* Montreal, Canada.
GÜRSEL, I., STOUFFS, R. & SARIYILDIZ, S. (2007) A Computational Framework for Integration of Performance Information during the Building Lifecycle. *CIB-W78 International Conference IT in Construction.* Maribor, Slovenia.
GÜRSEL, I., STOUFFS, R. & SARIYILDIZ, S. (2008) Managing Visual Complexity in a Digital Performance Assessment Tool. *Intelligent Computing in Engineering.* Plymouth, UK.

Research Period

September 2006 - September 2010