

Decision Support for Energy Efficient Redesign

Knowledge modeling (KM) for improvement of indoor climate in existing housing

Subject

Energy reduction and quality of indoor climate are equally important in the redesign process of buildings where the former is related with the efficiency of the buildings in terms of environmental and economic concerns and the latter is related with the health and comfort of the occupants.

Goals

This research aims to contribute to energy efficient redesign processes of the existing housing stock within the context of sustainability. The main objective is to present an approach to provide integrity to deal with the growing amount of information and processing of this information in energy efficiency and indoor climate relationship during a redesign process of existing housing. The focus of this practical problem of energy efficiency is to ensure good indoor climate on several energy levels, from the less ambitious one till the most ambitious one with an emphasis on natural ventilation possibilities.

- Find out measures ensuring good ventilation and indoor climate (each action will have a consequence in terms of energy efficiency)
- Introduce a number of architectural measures to the architect related to ventilation to see:
 - Possibilities of improvement,
 - Analysis of each action,
 - How to trace back in design and change the action: iterative generation and analysis process.

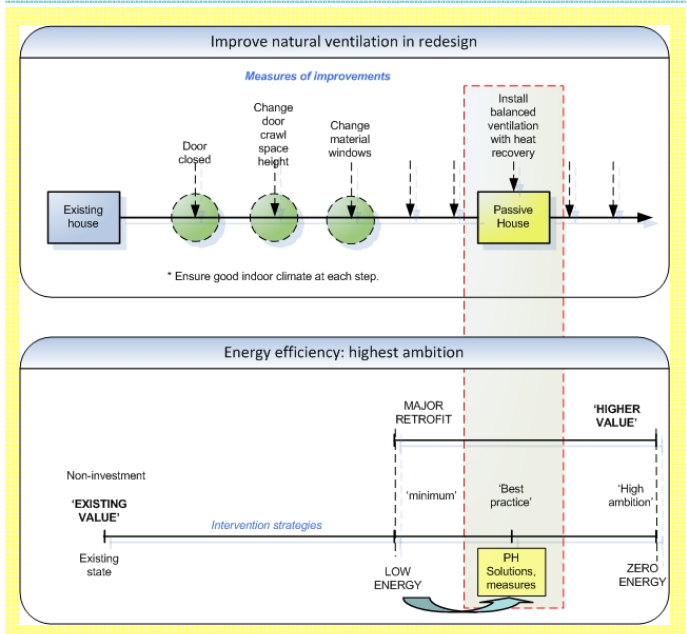
Expected Results

To improve the energy efficient redesign processes, possibilities of ICKT will be investigated and a decision support tool for the architect is intended to be developed as a final output. The tool is considered to provide:

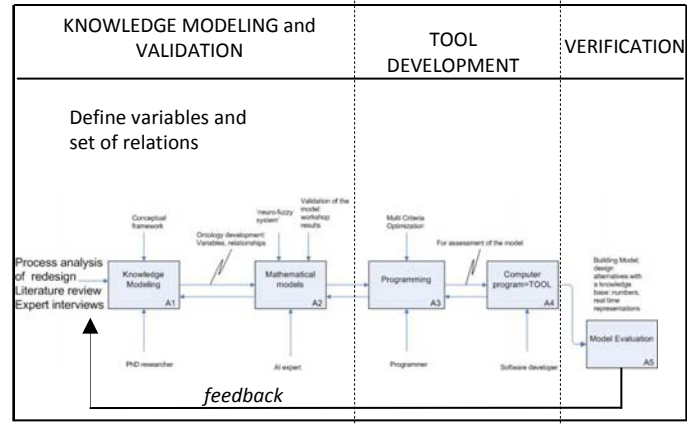
- Defining a vocabulary of actions for airflow strategies- specific actions to the building to improve indoor climate – starting with most obvious and simple practical measures,
- Providing the architect ‘what if..’ scenario → which also warns about increase in energy use – enabling to see the consequences of actions,
- Generating alternatives and making the steps visible for the architect.

Investigation of natural ventilation potential for energy efficient redesigns

IMPROVE NATURAL VENTILATION



KNOWLEDGE MODELING and VALIDATION | TOOL DEVELOPMENT | VERIFICATION



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Knowledge modeling (KM) for improvement of indoor climate in existing housing



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Energy reduction and quality of indoor climate are equally important in the redesign process of buildings where the former is related with the efficiency of the buildings in terms of environmental and economic concerns and the latter is related with the health and comfort of the occupants.

Goals

This research aims to contribute to energy efficient redesign processes of the existing housing stock within the context of sustainability. The main objective is to present an approach to provide integrity to deal with the growing amount of information and processing of this information in energy efficiency and indoor climate relationship during a redesign process of existing housing. The focus of this practical problem of energy efficiency is to ensure good indoor climate on several energy levels, from the less ambitious one till the most ambitious one with an emphasis on natural ventilation possibilities.

Main goals are to:

- Find out measures ensuring good ventilation and indoor climate (each action will have a consequence in terms of energy efficiency)
- Introduce a number of architectural measures to the architect related to ventilation to see:
 - Possibilities of improvement,
 - Analysis of each action,
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Research Question

- "Which parameters of building design are significant for providing good indoor air quality in relation to energy efficiency decisions?"
- "How does the energy consumption of a building relate to the redesign of air flows?"
- "What are the types of complexities, problems in building redesign decisions to provide energy efficiency and good indoor climate?"
- To what extent they can be supported with tools?

Strategy

The research started with literature survey, expert interviews to identify the significance of ventilation in redesign process in relation to energy consumption. According to findings, a knowledge framework will be established. There will be a workshop organization to agree on a generic knowledge model which will provide the validation for the model. Finally, verification of the model will be done with a case study application.

1. Conceptual Framework
2. Knowledge Modeling
3. Tool Development – can be an Multi Criteria Optimization application
4. Evaluation – application to a specific context: case study

Expected Results

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Research Period

2008 – 2012