

REVHA TRC Meeting, Brussels

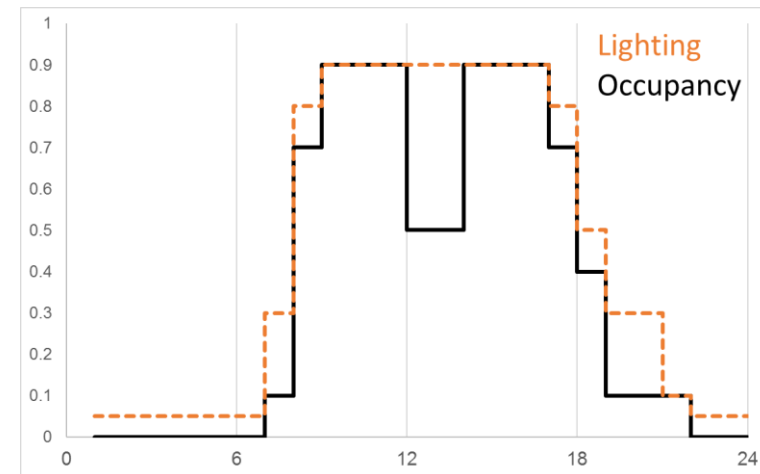
Proposal for new Task Force on 'Occupant-Centric Building Design and Operation'

Andreas Wagner
Head of Building Science Group
Karlsruhe Institute of Technology
Department of Architecture

Background

- Occupant behaviour has a strong influence on building energy performance
- Reasons for occupants' interventions:
 - dissatisfaction with building automation
 - interfaces are not designed/equipped for intended purpose
 - designers / building managers do not fully consider –or understand– occupants' needs in building design

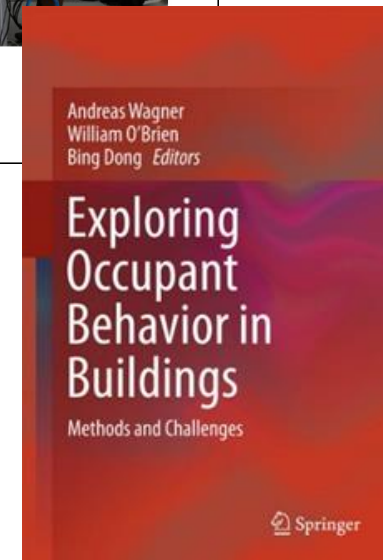
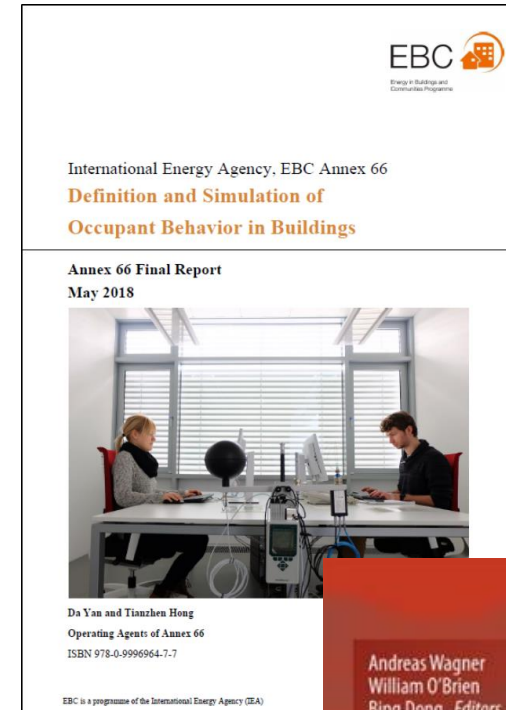
→ **Occupants have to be included into overall building concept (by providing adaptive opportunities) and into control strategy (with appropriate interfaces)**



International research activities

IEA EBC Annex 66 (finished)

- Detailed review of data collection methods (sensors, research methods)
- Detailed occupant modelling guidelines and theory
- Investigation of relationship between model application and model complexity (*fit for purpose*)
- Understanding of occupant diversity modelling
- Comparison and evaluation of developed models
- Implementation and testing of occupant models in various tools/obFMU
- Understanding of relationship between engineering and social science methods to study occupant behaviour
- 30 case study buildings



Objectives of running IEA EBC Annex 79 (2018 – 2023, OAs: Liam O’Brien, Andreas Wagner)

- **Improvement of knowledge about occupants’ interactions with building technologies.** Specific focus on:
 - comfort-driven (thermal, olfactory, visual, aural) actions caused by multiple and interdependent environmental influences which are not yet covered by current models
 - building technologies’ interfaces in terms of their suitability for taking advantage of adaptive opportunities, and their effect on building energy consumption

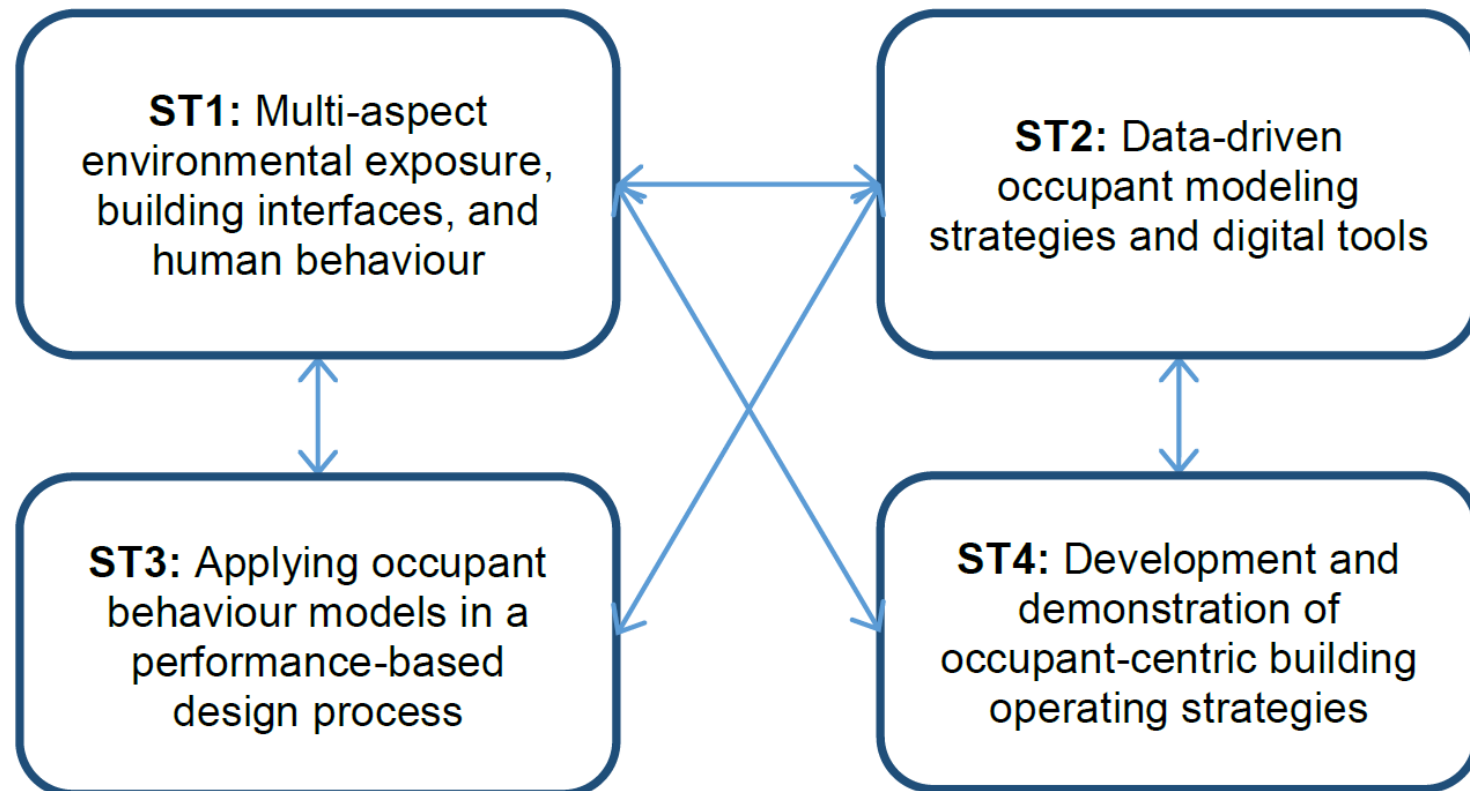
- **Deployment of ‘big data’** (e.g. data mining and machine learning) for the building sector based on various sources of building and occupant data as well as sensing technologies

- **Sustainable implementation of occupant behaviour models in building practice**
 - guidelines / recommendations for standards for applying occupant behaviour models during building design and operation
 - focused case studies to implement and test the new models in different design and operation phases in order to get valuable feedback

Scope of the Annex work

- Building up a **framework for identifying and describing the main influencing factors of occupancy and occupants' actions** in buildings and their interrelations
- All activities contribute to **reduce operating energy of buildings, while improving comfort by offering applicable adaptive opportunities to occupants**
- **Focused case studies as a platform to implement, test and demonstrate** new models and guidelines emerging from Annex research in a real building context during different design and operation phases
 - **Primary focus on office and residential buildings** though developed methodologies can also be applied to other building types
- **Recommendations and guidance for further development of standards and codes**
- **Research methods from various domains** like engineering, architecture, information technology, psychology, social sciences, etc.

Organisation of Annex 79



Proposed activities for REHVA TRC

- Focus on application of occupancy and occupant behaviour models in building design and operation
- Documentation of best-practices for occupant-centric design workflows, and optimal control strategies
- Collection of case studies/demonstration projects, including lessons learned
- Development of guidelines for designers and building operators in order to implement occupant behaviour models in building practice
- Recommendations on occupant modelling in building energy codes
- Recommendations for standards on occupant metering/sensing infrastructure and controls

Proposed activities for REHVA TRC

First steps:

- “Advertisement” of Task Force, recruiting participants
- Organization of a meeting (either web-based or during an international conference)
- Development of a work plan, establishment of work groups
- **Outcome:** REHVA Guidebook

Contact: Andreas Wagner, Karlsruhe Institute of Technology
wagner@kit.edu