



International Building Performance Evaluation (IBPE) Symposium

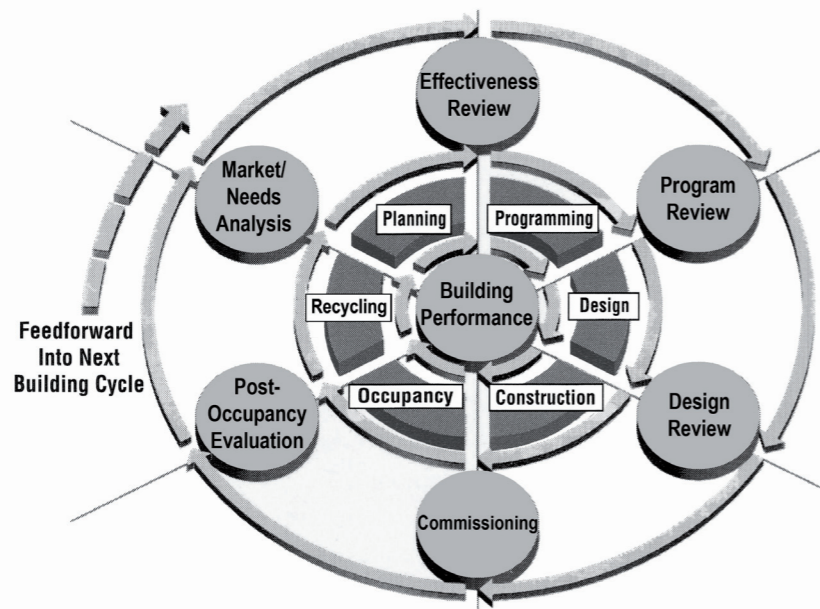
**Acceptance of Intelligent Building Technologies in Germany:
Does the User get what he wants?**

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Building Performance Evaluation (BPE) Process Model

(based on Preiser, W./Schramm, U.: „Building Performance Evaluation“ in Watson, D. et al. [eds.]: Time-Saver Standards, New York: McGraw-Hill, 1997, p. 234)

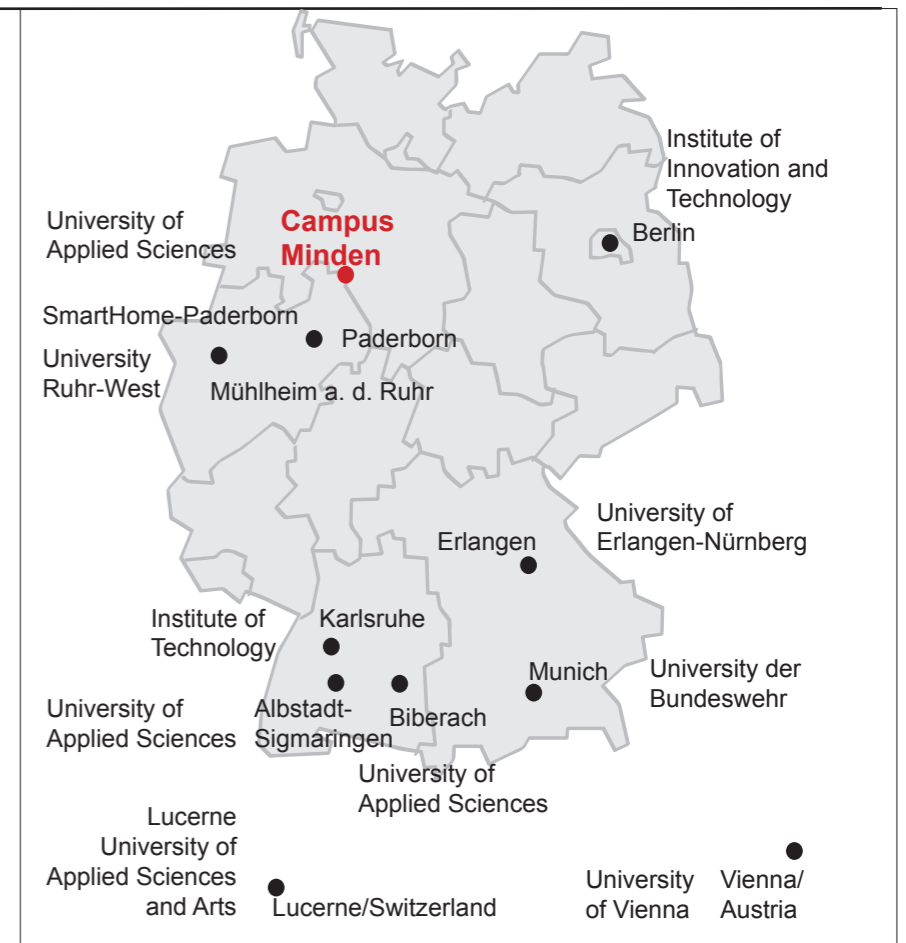


And what are the consortium's activities today?

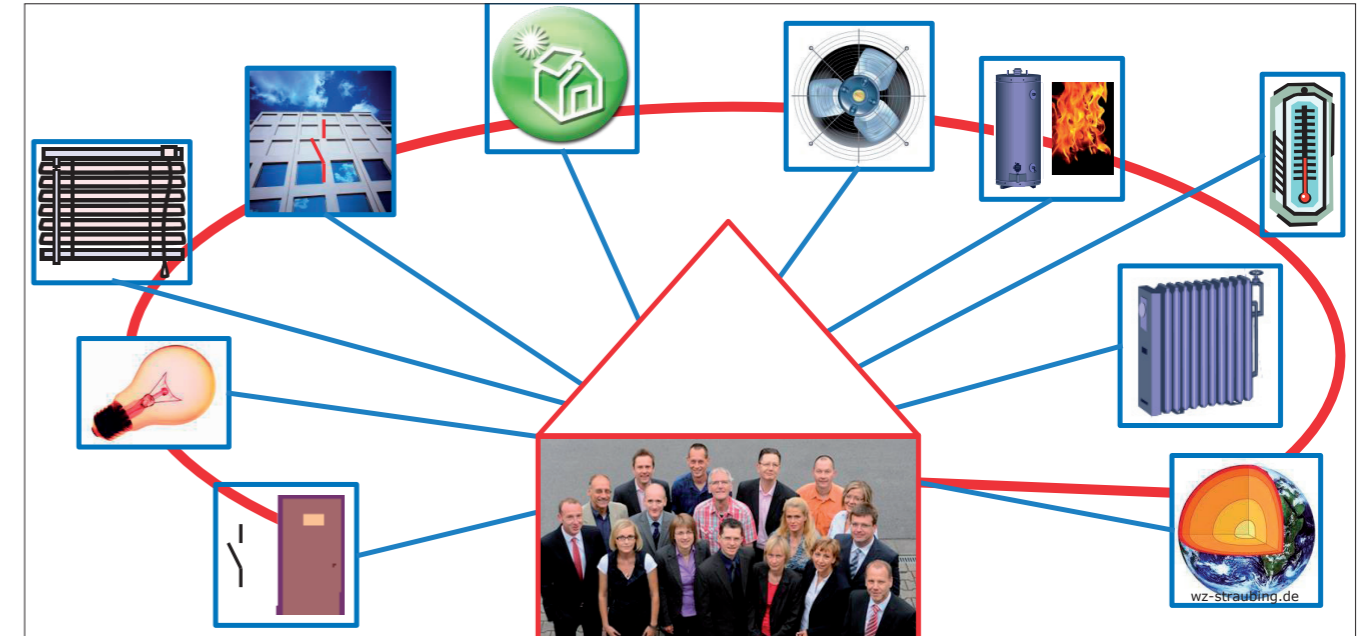
- BPE process model as a systematic approach
- work published in two books
- attendees: learn about current issues in participatory programming, performance-based design, occupancy research/practice

Various Research Centers in Germany: research priorities vary from place to place (Source: U. Schramm with S. Spanehl)

Campus-based research project: „Acceptance of intelligent building technologies: energy-efficiency, **well-being**, security“, divided into 3 sub-projects; participating professors from six disciplines: architecture, civil and electrical engineering, psychology, informatics along with industry partners (Source: O. Wetter)



Building Intelligence & User (Source: O. Wetter)



What is the framework of the ongoing research project?

- studies indicate increasing use of building automation systems
- but various factors may limit their acceptance by occupants
- study focus on building user: his needs, expectations, attitudes
- use expansion of Campus Minden (from 650 to 1600 students)



New Campus Building
(Source: U. Schramm / May 7, 2015)

Client: BLB NRW
 User: FH Bielefeld
 Foot print: 33 x 41 m
 Height: 17 m
 Costs: 14 Mio. Euro
 Programming: 2008
 Construction: 2013
 Completion: 2015
 (Source: FH Bielefeld)



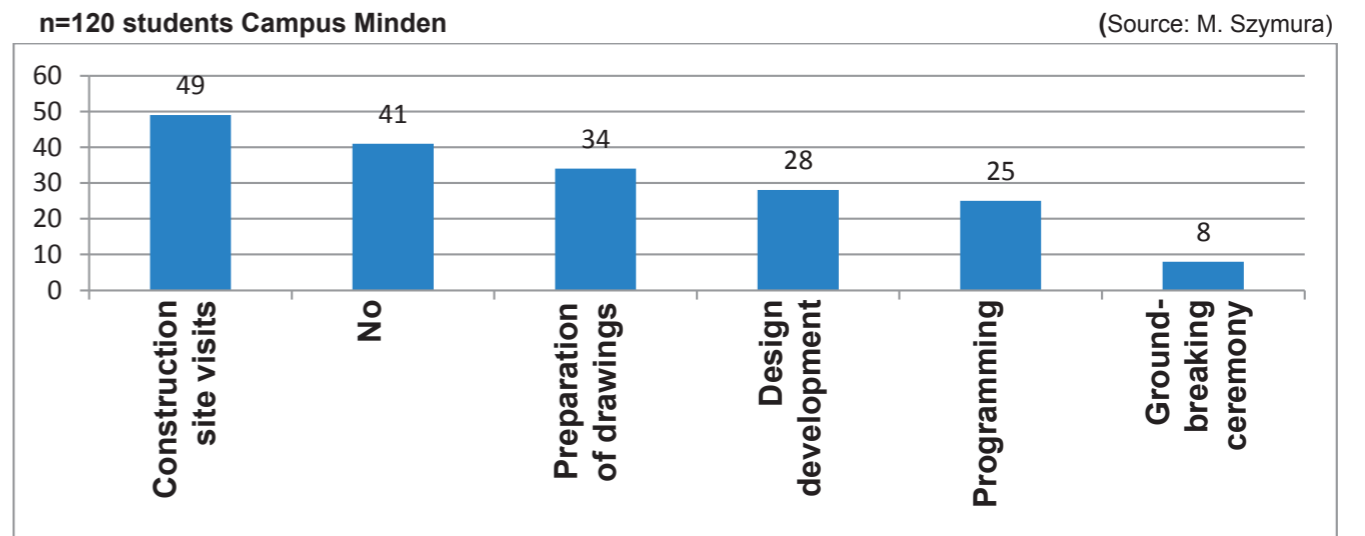
left:
Atrium in the library
 right:
Building automation system
with 3000 sensors and actors
 (Source: U. Schramm)



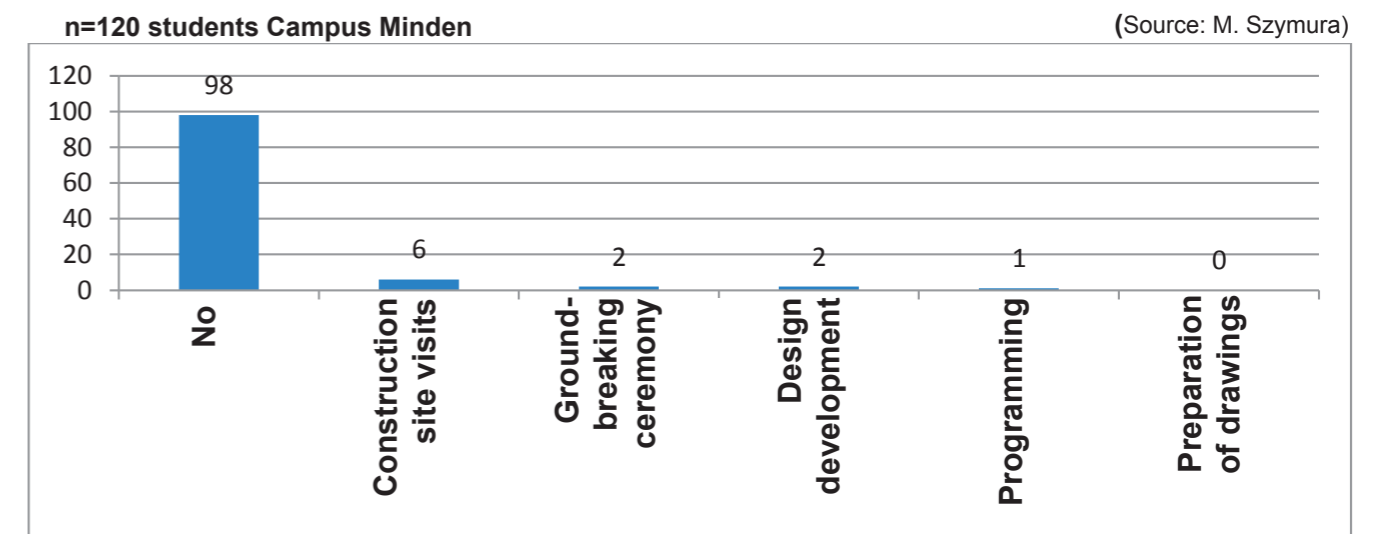
Existing Campus building A,
former Prussian Cavalry
barracks
 (Source: U. Schramm)

What are the research objects we are focusing on?

- new building: cafeteria, library, 15 seminar rooms, 40 offices
- energy efficiency class A, geothermal + photovoltaic energy
- open building automation allows demonstration + research
- existing buildings to be made 'intelligent' afterwards



Would you have been interested to participate during the phases of planning and constructing the new Campus building?



Did you actually participate in the new Campus building project?

What is the impact of participatory planning processes?

- Pre-occupancy evaluations with students show: need to participate is high (in architecture more than in informatics)
- in the case of New Campus Building: almost no participation
- in the case of CITEC building: almost no participation as well

POE: intelligent Campus building CITEC



POE of the Center of Excellence Cognitive Interaction Technology (CITEC), University of Bielefeld, 2014
Source: P. Köhn



One of 3 green inner courts
Source: P. Köhn



Patrick Köhn, winner of GEFMA grand prize 2015 for his master thesis 'The acceptance of Intelligent Campus Buildings - Case study of the Research Facility CITEC in Bielefeld', 2014
Source: U. Mosler



What could be learnt from the CITEC building?

- POE as master's thesis: focus on acceptance of another intelligent campus building: users are interested to give feedback
- online tool for survey (110 users/60 %), expert interviews etc.
- wish to participate: 34 % in architecture, 72 % in technologies

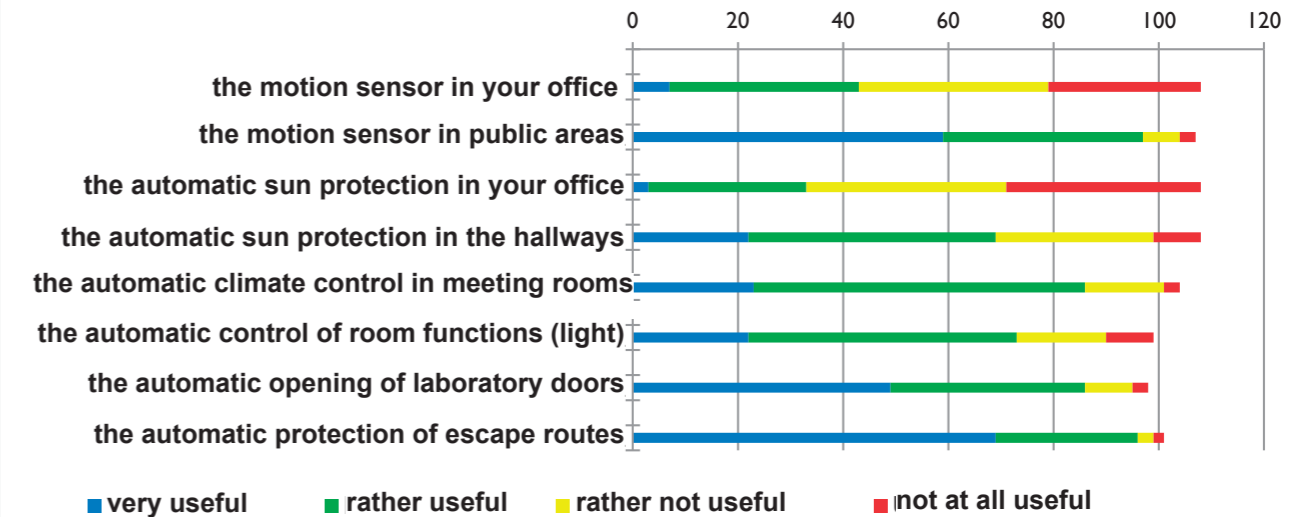
CITEC office: satisfaction with technologies



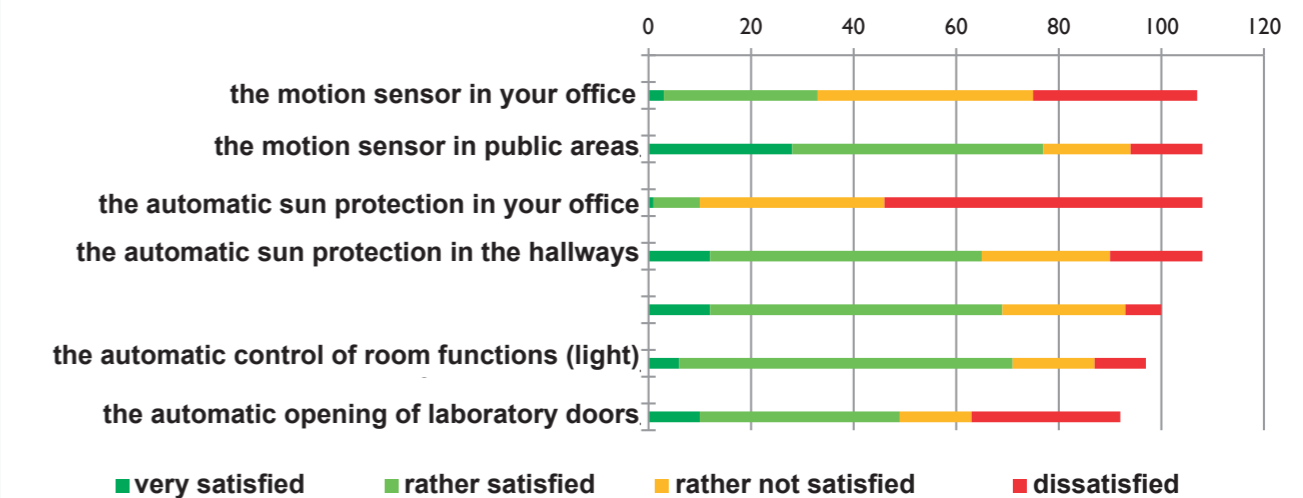
CITEC standard team-office
(Source: P. Köhn)

Usefulness (1) and satisfaction (2) with intelligent building technologies
(Source: P. Köhn)

1) How useful is...



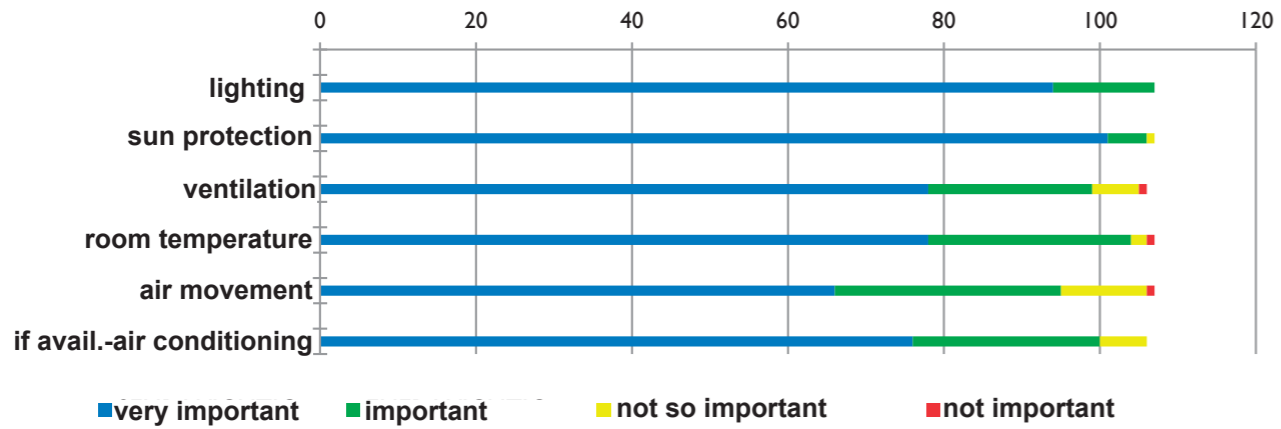
2) How satisfied are you with...



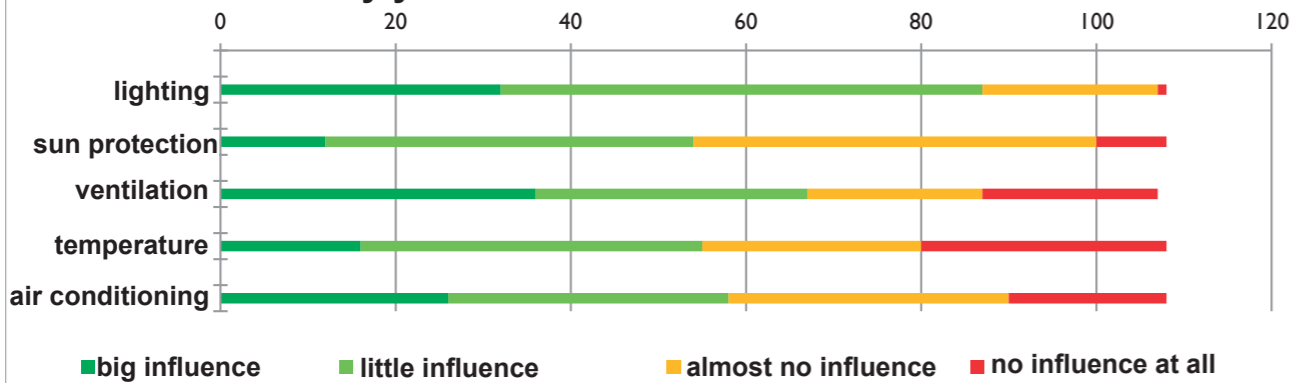
Which technologies decrease well-being + user satisfaction?

- sun protection: nice designed but wind sensitive => work is not possible while sunshine and wind
- motion sensor: regulates artificial light (presence/illuminance) => light is turning off while people are working

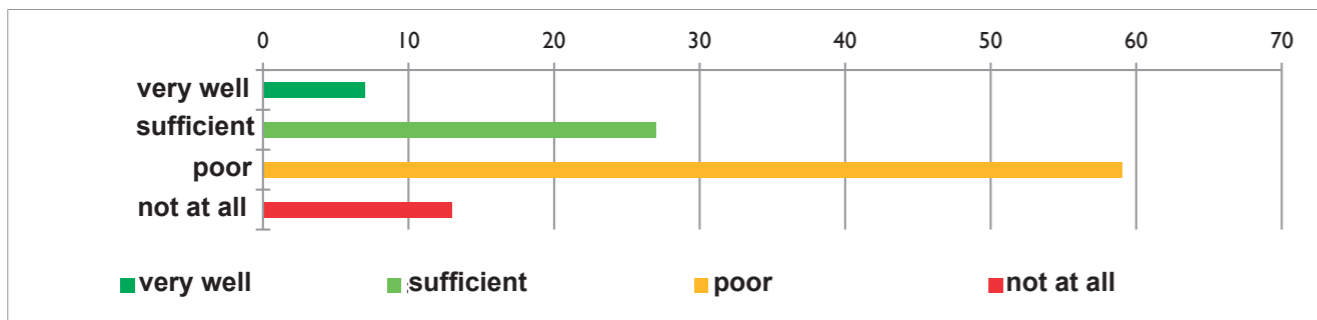
3) How important is to you the personal control of the following indoor climate factors?



4) How far can you influence in your office the following indoor climate factors by yourself?



5) How do you rate the level of information about the installed building technologies?



Importance to control (3) and level of influence (4) of indoor climate factors; level of information (5) about installed intelligent building technologies (Source: P. Köhn)

What are the barriers for acceptance?

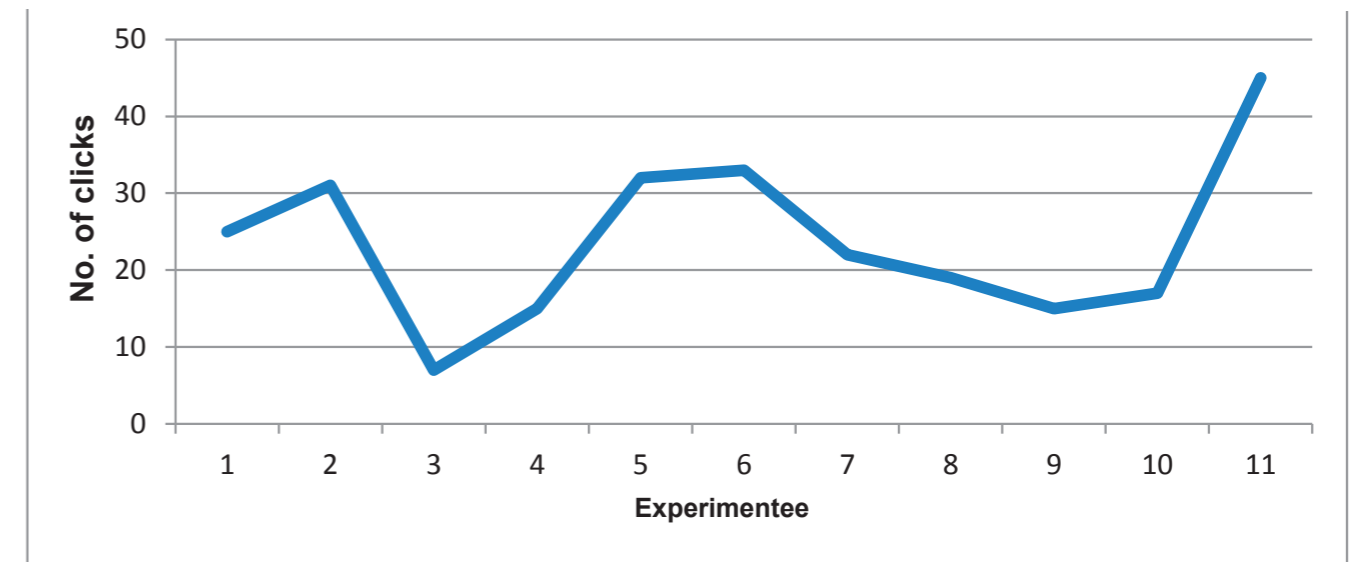
- while 90 % rate control of indoor climate as (very) important
- in reality only 50 % have influence on indoor climate
- information about installed building technologies is rated poor (70 %); lack of information during planning phase is criticized



Display of control panel Siemens UP 227 (Source: M. Maahs)

New Campus Building: standard office for professors (Source: U. Schramm)

Number of clicks per experimentee to lower the blinds for sun protection (Source: M. Maahs)



What measures will increase well-being and acceptance?

- CITEC: users want to control climate manually by themselves
- New Campus Bldg.: windows to open / individual control panel
- but: usability-testing of multi-functional control panel - too many clicks (23,7 vs. 4) due to structure of menue/sections of display



Groundbraking ceremony for the New Campus Building, without students, but with representatives of the client, the county, the city, the university and the ministry:official press release
(Source: P. Piecha, Nov. 5, 2013)



Topping-out ceremony for the new building, students - the future building users - were again not invited
(Source: U. Schramm, July 4, 2014)



Rare opportunity of user involvement: construction site visit for students of architecture, civil engineering and construction project management
(Source: U. Schramm, Nov. 12, 2014)

Intelligent technologies: Does the user get what he wants?

- individual attitudes and technological affinity less significant
- lost of control may result in frustration and reactance
- participatory planning/user involvement facilitate acceptance
- pre-/post-occupancy evaluations: useful tools in life cycle

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Selection of publications:

- Baus, U.; Schramm, U.: „Architectural Criticism and Building Performance Evaluation in Germany“ in: Preiser, W.; Davis, A.; Salama, A.; Hardy, A. (eds.): Architecture Beyond Criticism - Expert Judgment and Performance Evaluation, Routledge, Abingdon, 2015
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