UNIVERSITY OF CAMBRIDGE

DEPARTMENT OF ARCHITECTURE
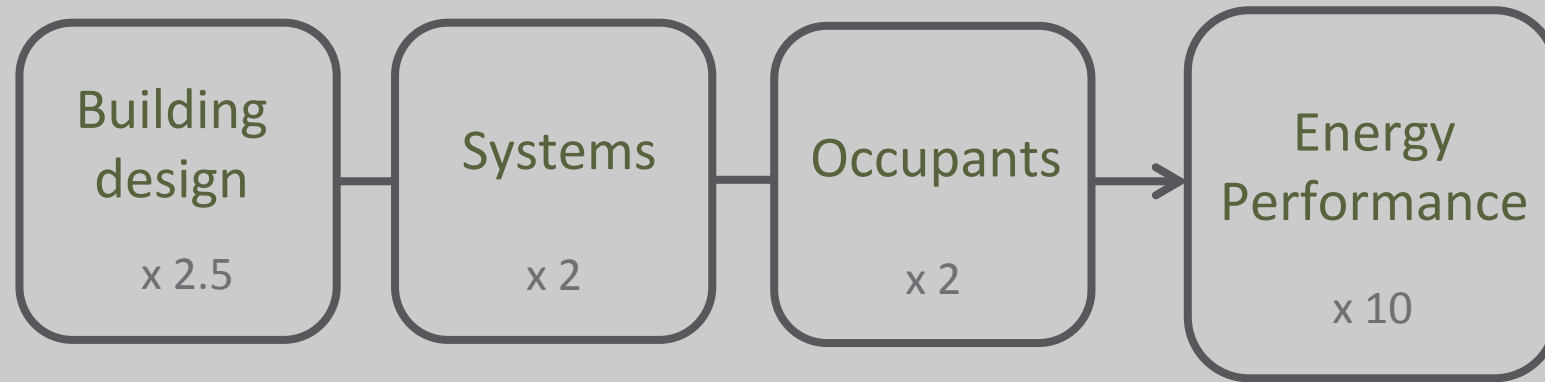
Why does energy use feedback not work in workplaces?

Insights from Social Practice theory

4th June 2015   ECEEE Summer Study

Dimitra Dantsiou   Supervisor: Dr. Minna Sunikka-Blank

Building performance and occupants' behaviour

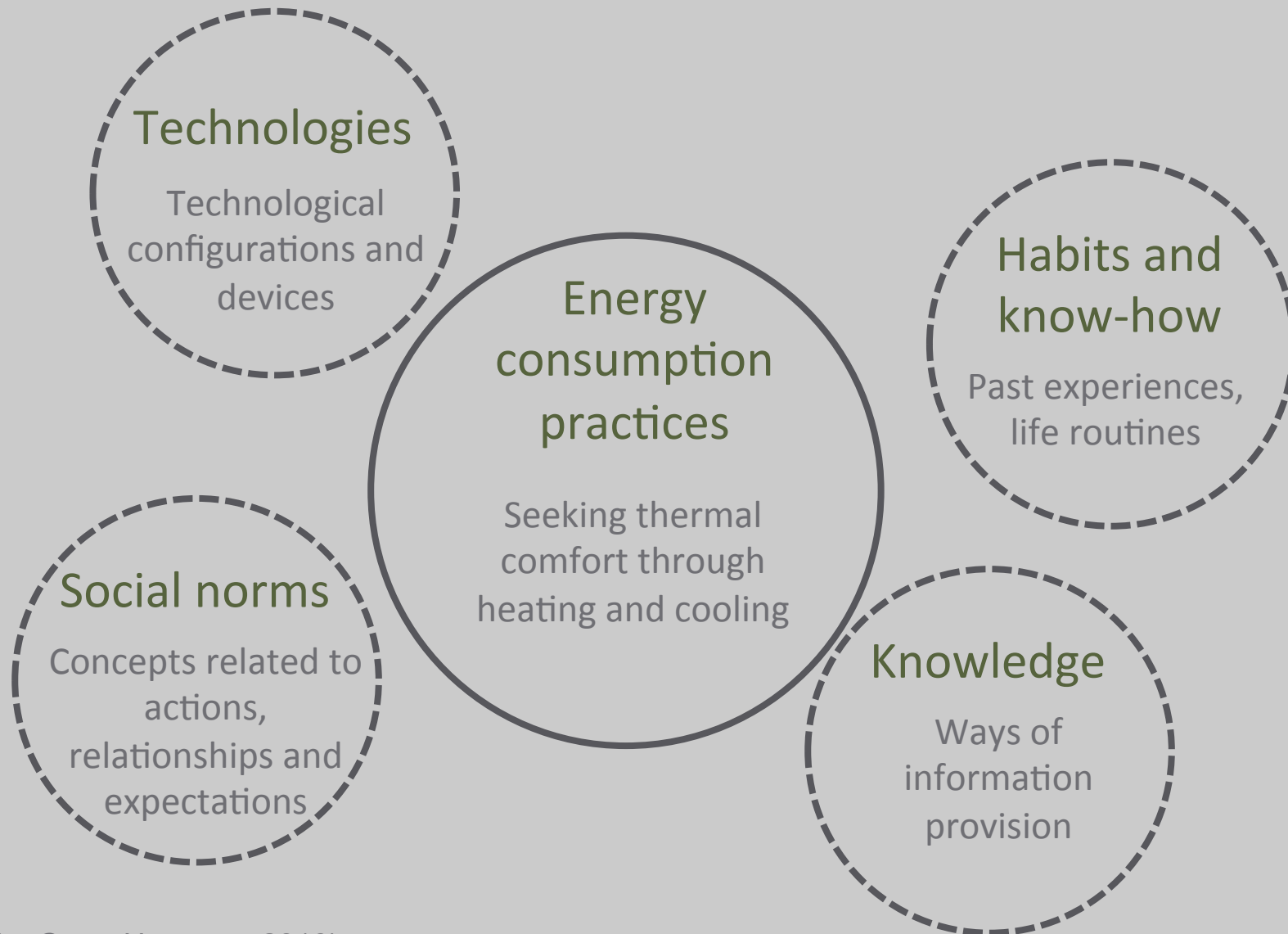Building design x 2.5 → Systems x 2 → Occupants x 2 → Energy Performance x 10

(Baker and Steemers, 2000)

*"In addition to technologies and architecture, **behaviour, lifestyle and culture have a major effect on buildings' energy use, presently causing 3-5 times differences for similar levels of energy services**. In developed countries, evidence indicates that **behaviours informed by awareness of energy and climate issues can reduce demand by 20% in the short term and 50% by 2050**."*

(IPCC, 2014)

Social Practice Theory

Technologies

Technological configurations and devices

Energy consumption practices

Seeking thermal comfort through heating and cooling

Habits and know-how

Past experiences, life routines

Social norms

Concepts related to actions, relationships and expectations

Knowledge

Ways of information provision

(adapted by Gram-Hanssen, 2010)

Research aim and methodology

The project aims to:

i)   investigate thermal comfort practices linked to energy use in workplaces,

ii) explore the impact of energy use feedback on changing them,

iii) understand energy saving as a social practice.

Case studies (7 offices, 22 participants)

- Questionnaire survey
- Semi-structured interviews (2 rounds, 30 min)
- Comfort diaries (3 x day, 1 week)
- Temperature and humidity monitoring (winter, summer)
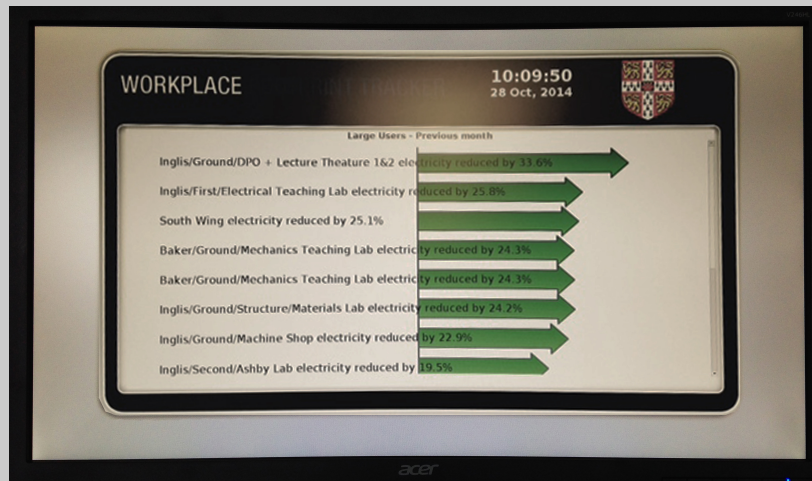- Workshop (users and stakeholders)

Phase 1
Winter study

↓

Phase 2
Summer study

↓

Phase 3
Summer workshop

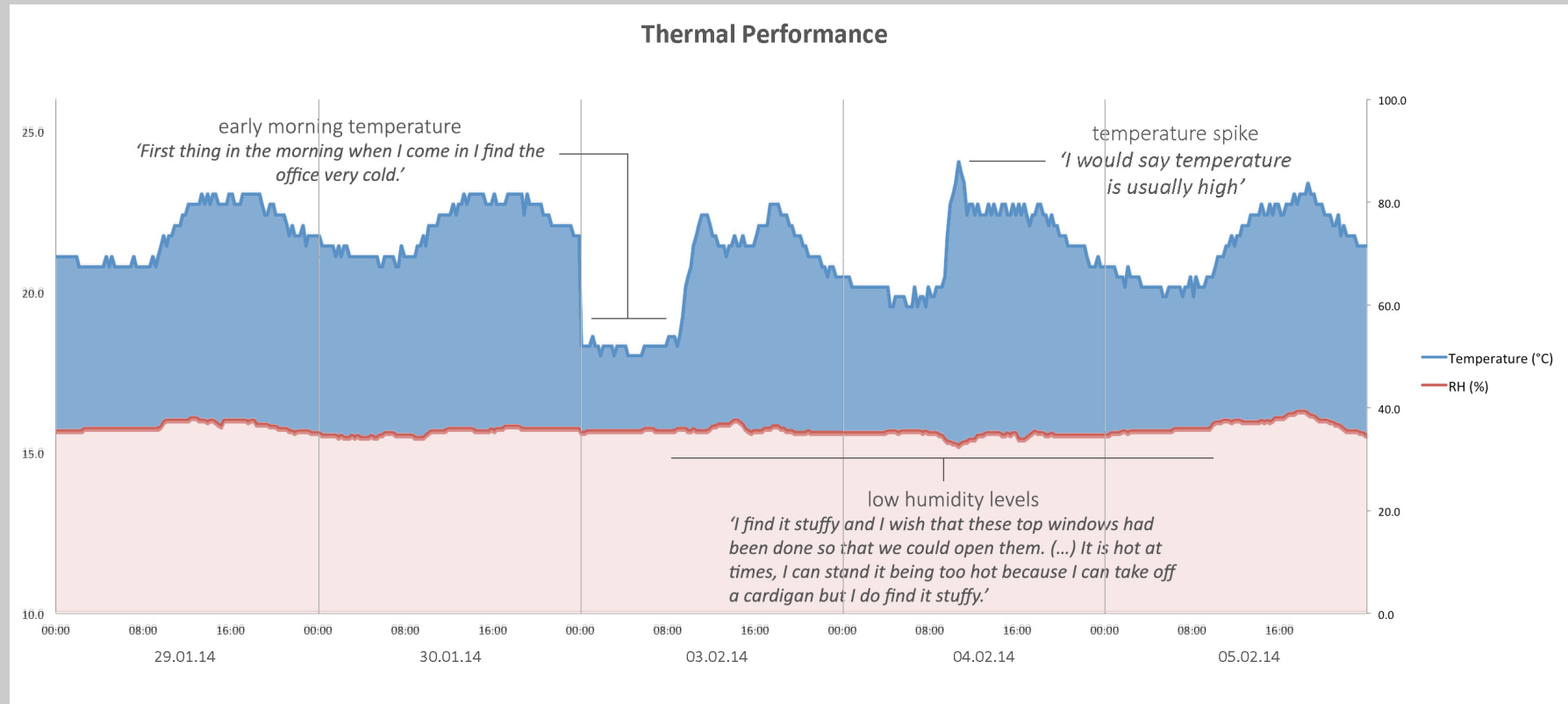# CUED: Behavioural Change Programme

- To reduce energy consumption among other efficiency measures a behavioural change programme was launched.

- Installation of 20 RTDs (Real Time Displays) in sub-metered spaces and parallel CO_2 Grand Prix competition.

- Feedback did not have any particular effect in changing energy use behaviour on the short-term.
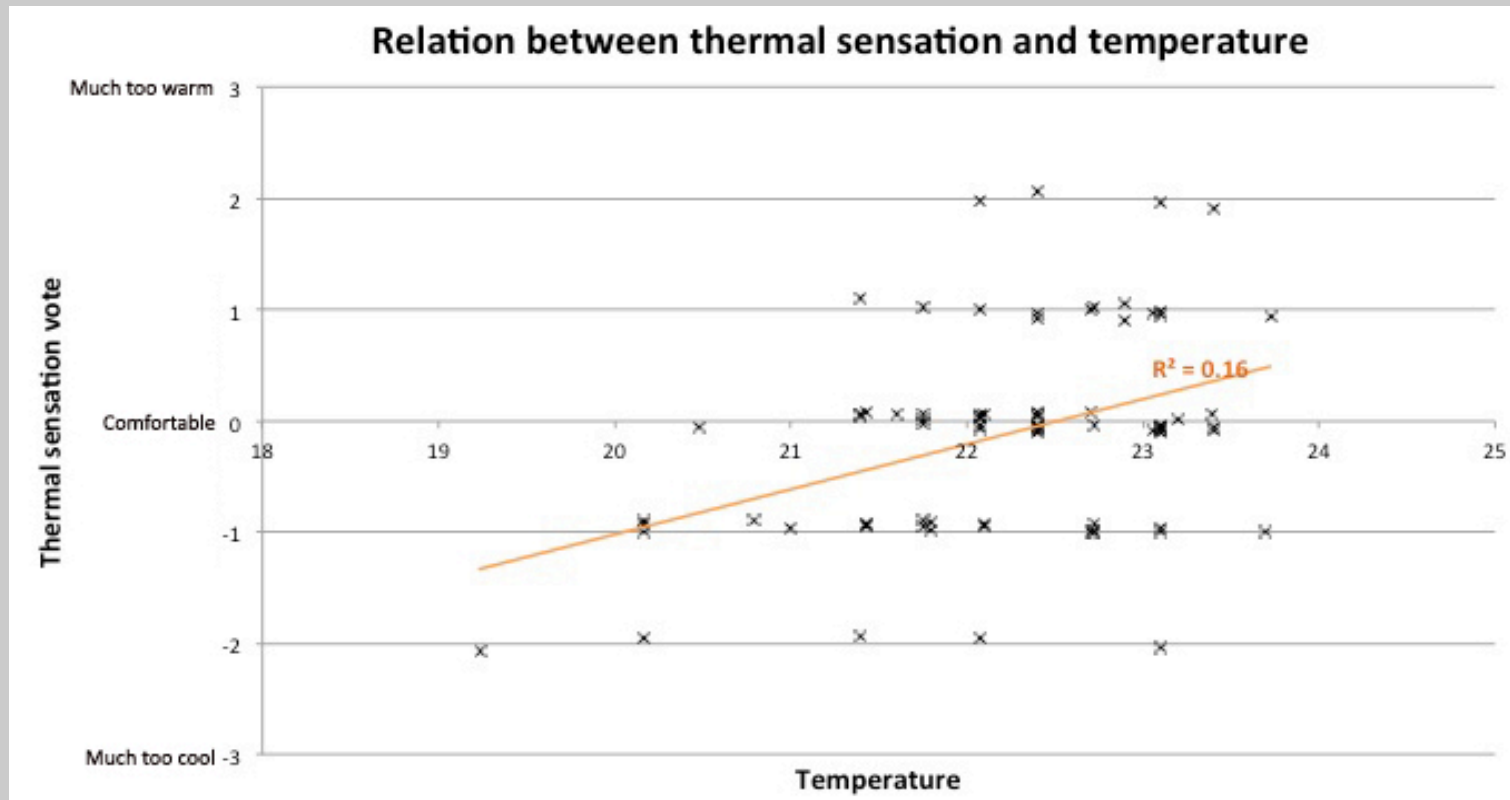
Investigating comfort practice elements

Investigating comfort practice elements

Thermal Performance

early morning temperature
'First thing in the morning when I come in I find the office very cold.'

temperature spike
'I would say temperature is usually high'

low humidity levels
'I find it stuffy and I wish that these top windows had been done so that we could open them. (...) It is hot at times, I can stand it being too hot because I can take off a cardigan but I do find it stuffy.'

Temperature (°C)
RH (%)

29.01.14   30.01.14   03.02.14   04.02.14   05.02.14

Investigating comfort practice elements

Knowledge

*"I think I am more aware now than I probably would have been, say four or five years ago, but I would like at home and here, **I would like something that actually it shows you what you are using. To make you perhaps a bit more aware** I think."*

*"Ever since we moved into here we have got no instruction manual for those control panels so **we tend to leave it how it is been originally set** … Other than that we have never been able to work how to set the timers on them."*

Habits

*"I just treat it as a workplace really, so **my home is different to my workplace** which is for normal people but I'd rather construct more in my house than I would in my workplace but if I learn things at work I could put into practice at my home."*

*"I think the workload of some people, you know, they don't bother, it's too much, you take some time out if you think 'Oh, I've got to go and turn that off', again **it's just taking the time out to do it, which given the amount of workload you just haven't got the time.**"*

Primary findings

Social dynamics

- Comfort preferences collectively shaped to avoid conflicts.
  - ➤ **Management intervention.**

Technologies

- Heating and cooling system configuration to influence a passive approach.
- Information through RTDs too technical to understand, remote location and lack of guidance.
  - ➤ **Individual choice option** on the information level of RTDs and control over heating system.

Workplace notion

- Difference between home and work adoptive actions.
- Lack of incentive.
  - ➤ **Green organisational identity.**

Thank you.

dd356@cam.ac.uk