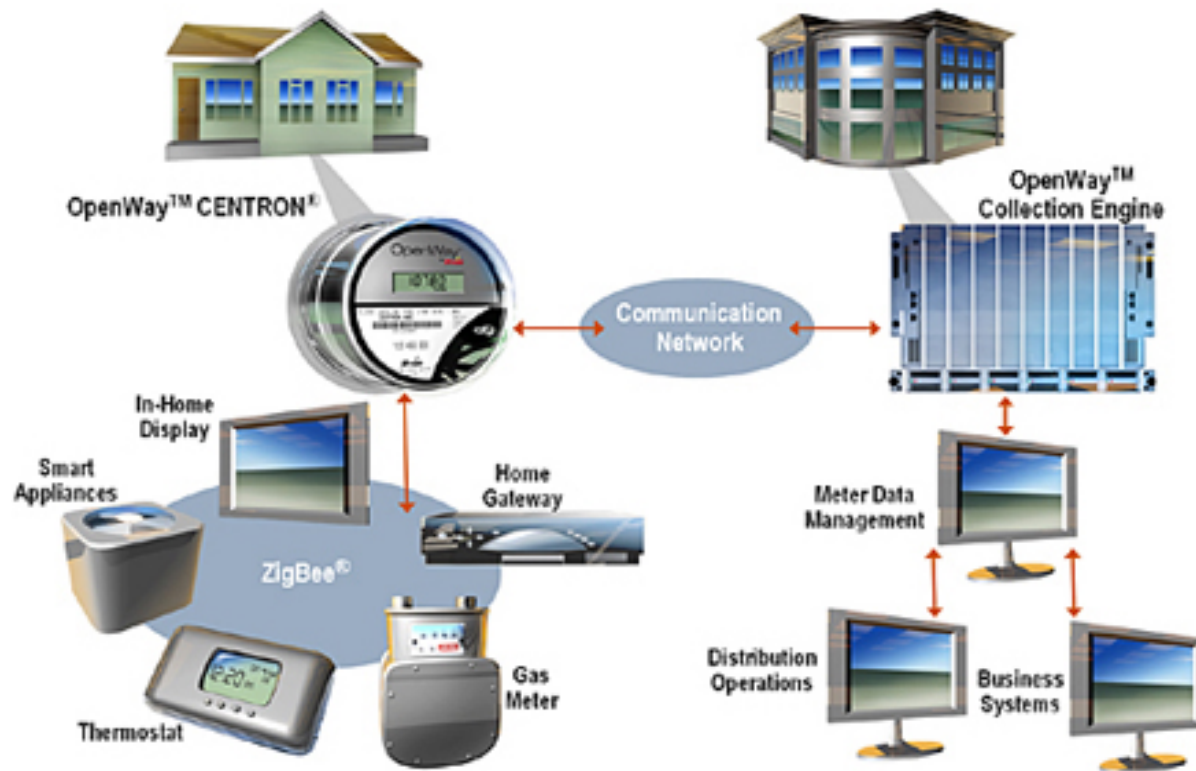


# User-Centred Design Research: Home Energy Controls

David Good

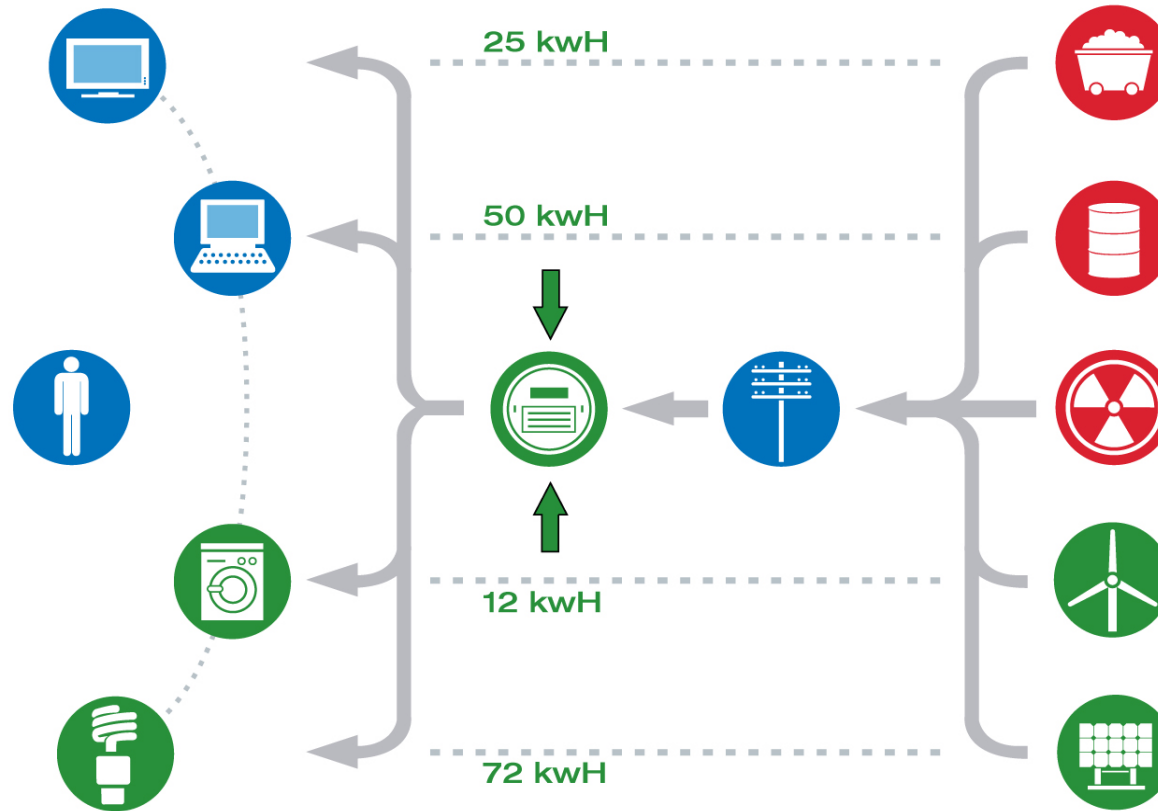
[dg25@cam.ac.uk](mailto:dg25@cam.ac.uk)

# Home Energy Use



<http://earth2tech.com/2009/02/09/san-diego-utility-to-roll-out-smart-meters-mid-march/>

# Home Energy Use



© Intercon

<http://progressivetimes.wordpress.com/2009/03/09/meters-can-make-us-all-a-little-smarter/>

# The Human Factor



Smart meters will work with real-time energy displays showing energy use around the home. Photograph: Energy Retailers Association/PA

- User choices can massively increase consumption.
- Commonly assumed that:
  - Change in knowledge & attitudes leads to change in behaviour
  - Cash is the most (only?) important incentive
  - People are mostly the same
- But, most of these devices end up in the attic very quickly

# Domain/Person/Activity Specificity



# What is to be done?

- Observing
- Interviewing
- Measuring
- Putting your own sense of the sensible aside. Try Method Acting. Beware of:
  - False consensus effect
  - Mistaking the plausible for the actual
  - Armchair psychology

# False Consensus Effect



*“Most important comedian of the past 25 years”*

Ross, L., et al (1977). The "false consensus effect": An egocentric bias in social perception and attribution processes. *Jou. Exp. Soc. Psy.*, 13(3), 279-301.

Medhurst, A. (2007). *A National Joke*. Oxford: Routledge

# The Plausible & the Actual

- Lazarsfeld on Stouffer's *The American Soldier*
  - Better educated men showed more psycho-neurotic symptoms than those with less education. (*The mental instability of the intellectual as compared to the more impassive psychology of the man-in-the-street has often been commented on.*) B,439.
  - Men from rural backgrounds were usually in better spirits during their Army life than soldiers from city backgrounds (*After all, they are more accustomed to hardships.*) A, 94.
  - Southern soldiers were better able to stand the climate in the hot South Sea Islands than Northern soldiers (*Of course, Southerners are more accustomed to hot weather.*) A, 175.
  - As long as the fighting continued, men were more eager to be returned to the States than they were after the German surrender. (*You cannot blame people for not wanting to be killed.*) B, 56l.

Lazarsfeld, P. (1949). The American Soldier--An Expository Review. *Public Opinion Quarterly*, 13(3), 377



# Armchair psychology

- Would you give electric shocks to this man?
  - Most people say they wouldn't themselves (beware social desirability)
  - Most say that most people wouldn't
  - 26/40 went all the way (450v)

Milgram, S. (1973) *Obedience to Authority*. London: Tavistock



# Retrofit Project

- Goal
  - *Reduce home energy consumption by improving the building fabric and changing behaviour through giving occupants information and control*
- Partners
  - Architectural practice
  - Control systems company
  - Social Housing Trust
  - CU

# Observing

- Tenants are quite a diverse social mix
- But often in financially difficult circumstances. Either because of:
  - Low or no income
  - Past debt problems
- And representative of a subset of the wider population on various dimensions e.g.
  - Employment
  - Education
  - Technical experience?
- On site observation







No Boost 1  
Late Boost 2  
Early

ROOM  
TEMP



INPUT 8/9-Very Cold  
4/8-Cold  
2/4-Mild

Weather

**Dimplex**

DO NOT COVER OR OBSTRUCT  
THE SURFACES OF THE HEATER  
Two supplies are taken into the  
heater. Isolate both before under-  
taking maintenance work.

Room  
Temp  
Boost

3  
2  
1



4  
3  
2  
1



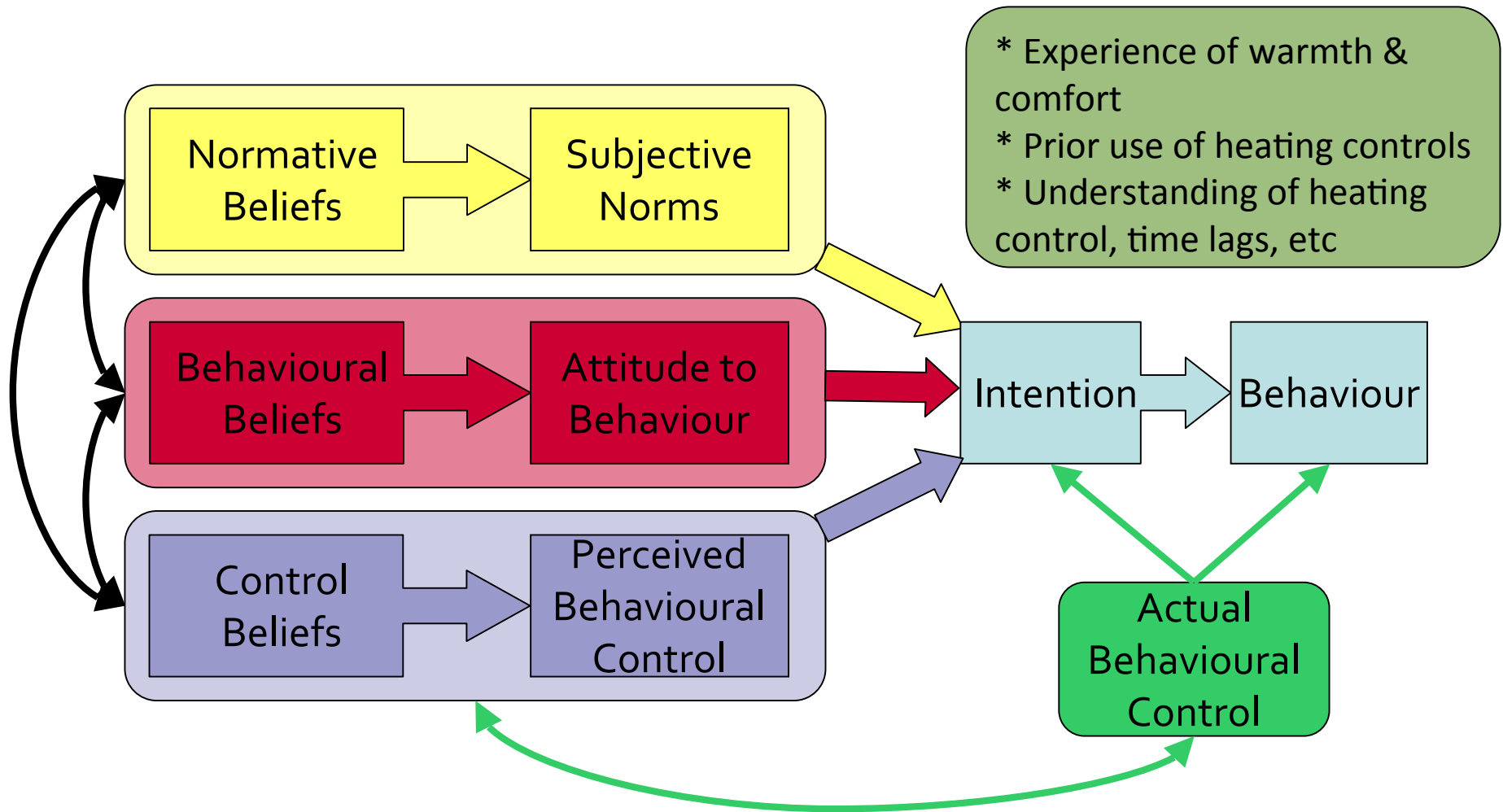
Input



# Interviewing

- Talking to those for whom you are designing a product makes sense as does talking to those who know them.
- Completely unstructured interviews can be helpful initially, but to make progress, focus is needed.
- Interview structure based on prior findings for this domain and this class of issue.

# Theory of Planned Behaviour



Ajzen, I. (2005). *Attitudes, personality and behavior*. Maidenhead: Open University Press.



# Findings

- Analysing this kind of data is far from simple.
  - Trends or the importance of outliers
- Control
  - Little sense of controlling the temperature.
  - At best a damage limitation exercise
- What others do
  - Vague understanding
- Value of money
  - Constraint vs cost
- Benefits from the change
  - Greater comfort at the same cost

# Technology probes

- Observing & Interviewing around a candidate application can be very informative.
- The Victorian Farm
- Think aloud protocols, concurrent & retrospective
  - Kuusela, H., & Paul, P. (2000). Favour concurrent

Kuusela, H., & Paul, P. (2000). A Comparison of Concurrent and Retrospective Verbal Protocol Analysis. *The American Journal of Psychology*, 113(3), 387-404

# Measuring

- Bad survey questions are very easy to write.
- Good interview material can be exploited to create good survey questions.
- Measures of social norms, attitudes, and control beliefs can give a broader understanding of whether or not interventions have been effective independently of behaviour change.

Oppenheim, A. N. (1992). *Questionnaire design, interviewing and attitude measurement* (New ed.). London: Continuum.