

Occupancy evaluation – a brief overview

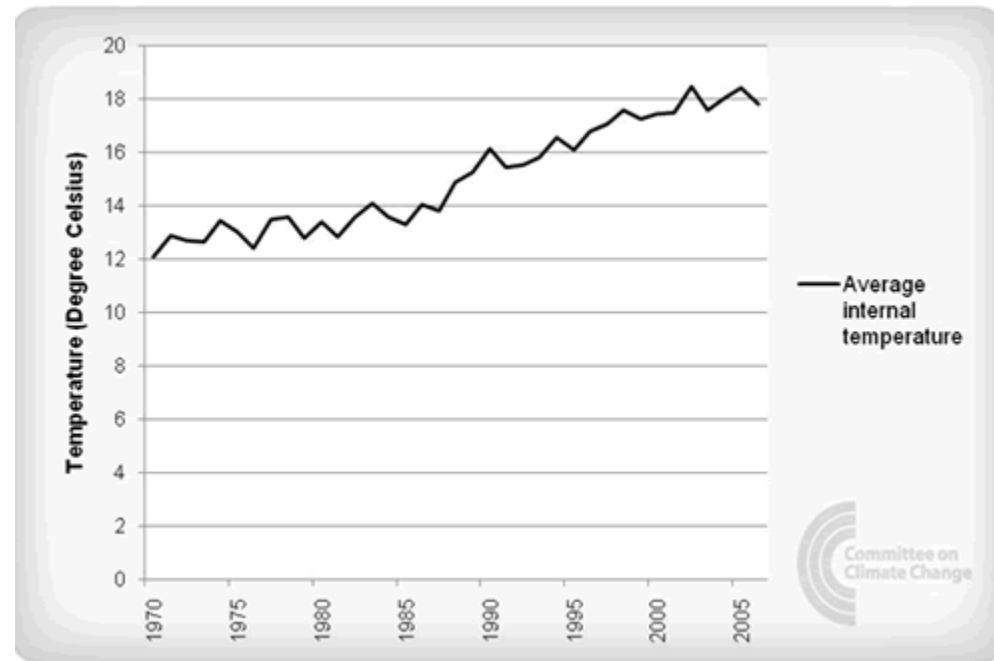
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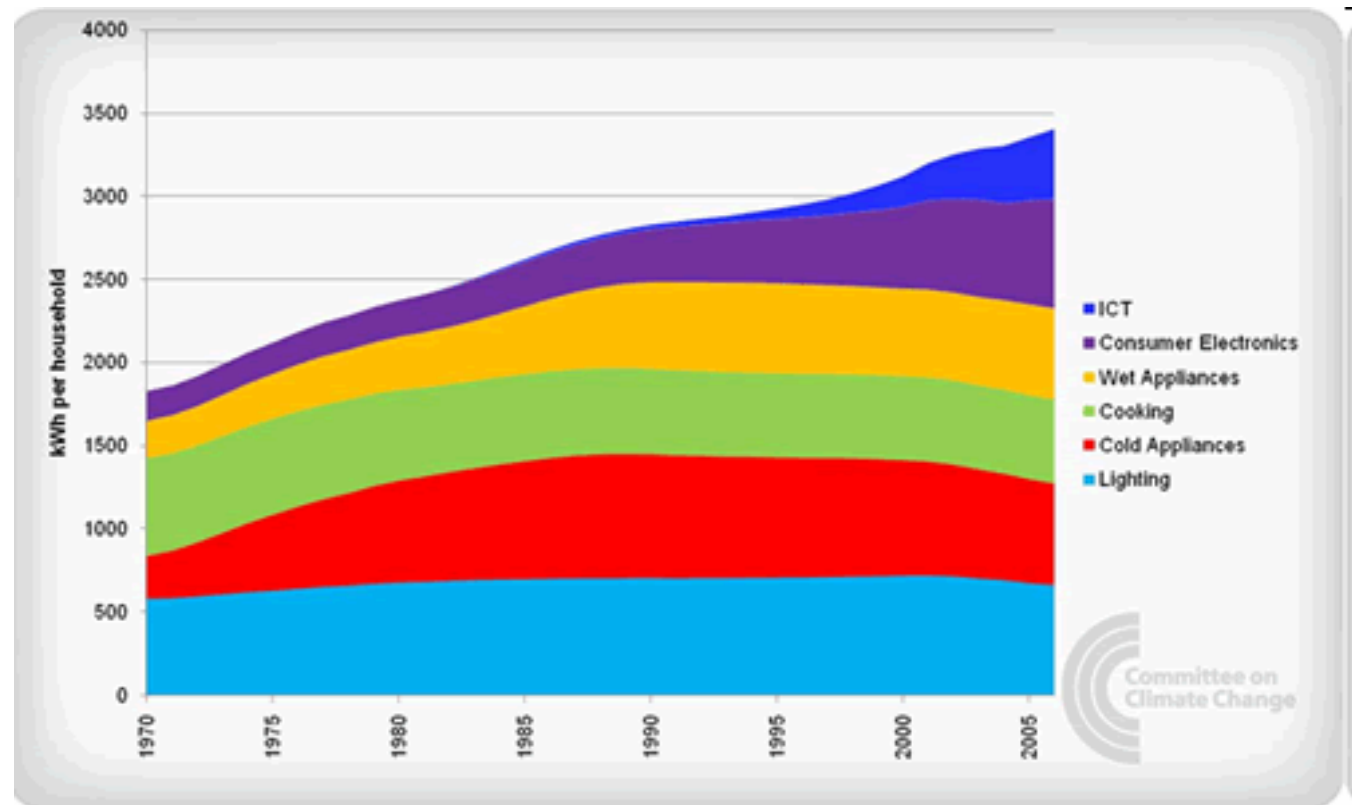
context – heating in homes

- Residential = 25% of UK Carbon emissions
- Despite improvements in insulation and efficiency, emissions have remained flat
- People now heat their homes to a higher standard



context – electricity consumption in homes

Electricity consumption per household has increased by 8% since 1990 -growth of computers, consumer electronics and number of homes.



the real problem....

- Big gap between prediction and observation
- Only half the predicted savings achieved from energy interventions - **why is this happening?**

We need better understanding of:

1. modelling of buildings at design stage
2. how buildings work in practice (building physics)
- 3. how people use buildings to create comfort**
4. fabric, technology, control systems **& occupant interactions**

(D.Shipworth, UCL, 2009)

occupancy evaluation aims to.....

- Triangulate perceptions and actions of residents with physical monitoring
- Identify the reasons **why** there are monitoring anomalies
- Understand the mismatch between design intentions and user actions
- Inform design/maintenance strategies



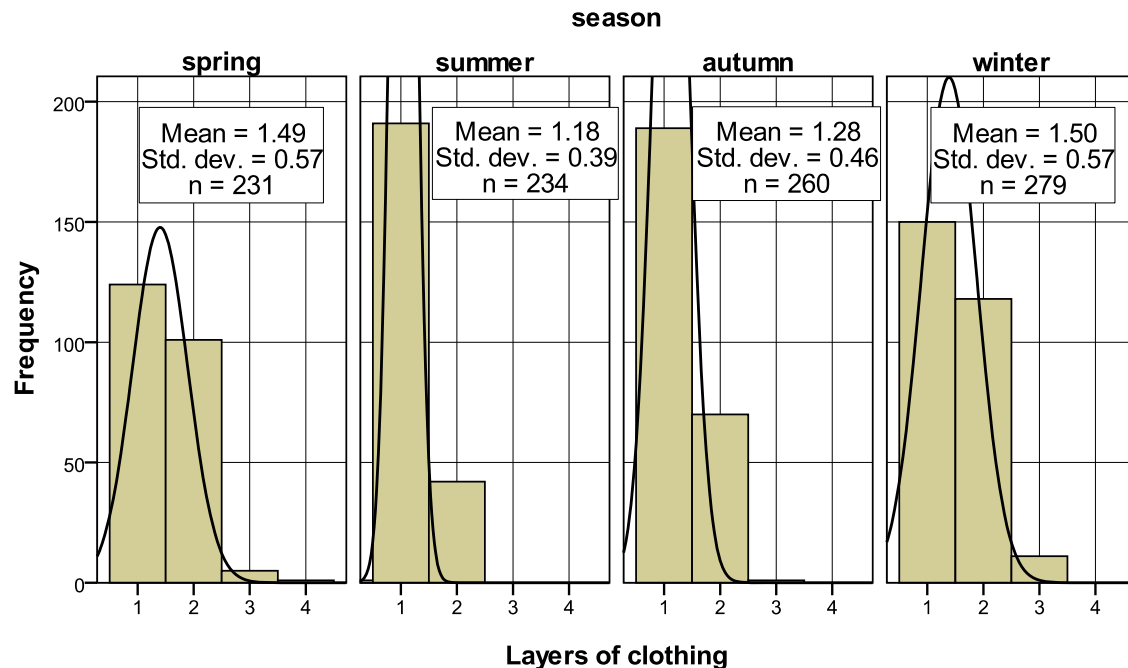
methods

- interviews
- questionnaires
- videoing by users
- thermal comfort surveys
- field observations during walk-through visits
- environmental audits (what is **actually** in the home)



thermal comfort survey – adaptive behaviour

- Residents adjust to warmer temperatures
- 1 layer of clothing often predominant in warm houses
- Need to be aware of energy ‘kickback’ in efficient houses



lifestyles affect energy use

- Exceptional use of white goods and electronic/ICT equipment
- Opening windows .v. MVHR
- User has little understanding of heating and ventilation controls

....how do we 'design' this mismatch out?



water use is an energy issue too....

	Frequency per day	Litres per event	Annual water use
Power shower	1	84	30,660
Power shower	0.3	84	9,198
Electric shower	1	27	9,855
Bath	0.3	73	7,994
Electric shower	0.3	27	2,956

Assumes 7 minutes for all showers: actually people spend longer in power showers than in electric ones – each extra minute of daily power showering adds 4,380 litres per year.

induction – the cinderalla in housing evaluation

- User manuals–very poor
- Users need to understand how to use home –occupancy evaluation identifies issues
- Customer services have little knowledge of innovative home features – need training
- Need to customise generic manufacturing information from **user perspective**



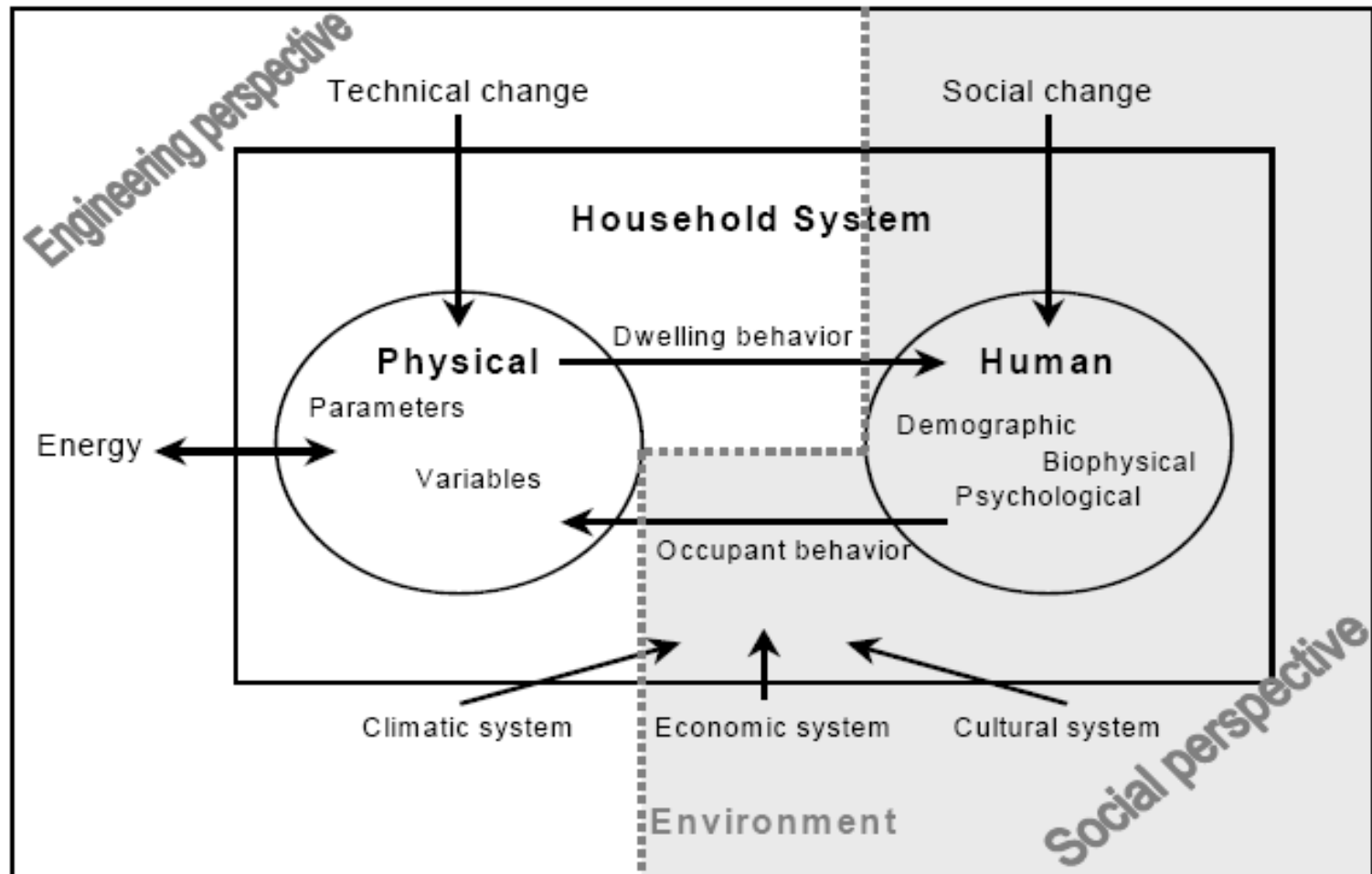
why occupancy evaluation is essential...

- **Lack of user understanding** contributes significantly to energy use –need to identify this and **design it out**
- Heating, lighting and ventilation controls are key issues
- Physical monitoring alone cannot explain influence of user on energy performance



Plasma tv screen is major energy issue

conclusion: more socio-technical research



Hitchcock, Guy 1993, 'An integrated framework for energy use and behaviour in the domestic sector', *Energy and Buildings*, Vol. 20, pp.151-157.

thank you for listening to this.....

GHA Event 29th March 2009

