

SMART METERS AND HOUSEHOLD ENERGY CONSERVATION

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OVERVIEW

- What are the SM purposes?
- Consumers: active or passive?
- Methodology and results of 6 large European studies on feedback
- Lessons from a small experiment framed in the ABC grammar
- Interpretations and reframing the issue

MANY FUNCTIONALITIES

Local consumption feedback and advice

Energy Savings

Home automation

Monthly invoicing

New payment methods
(tariffs, prepayment)

Electricity market

Demand response
(economic)

Smart
Meter

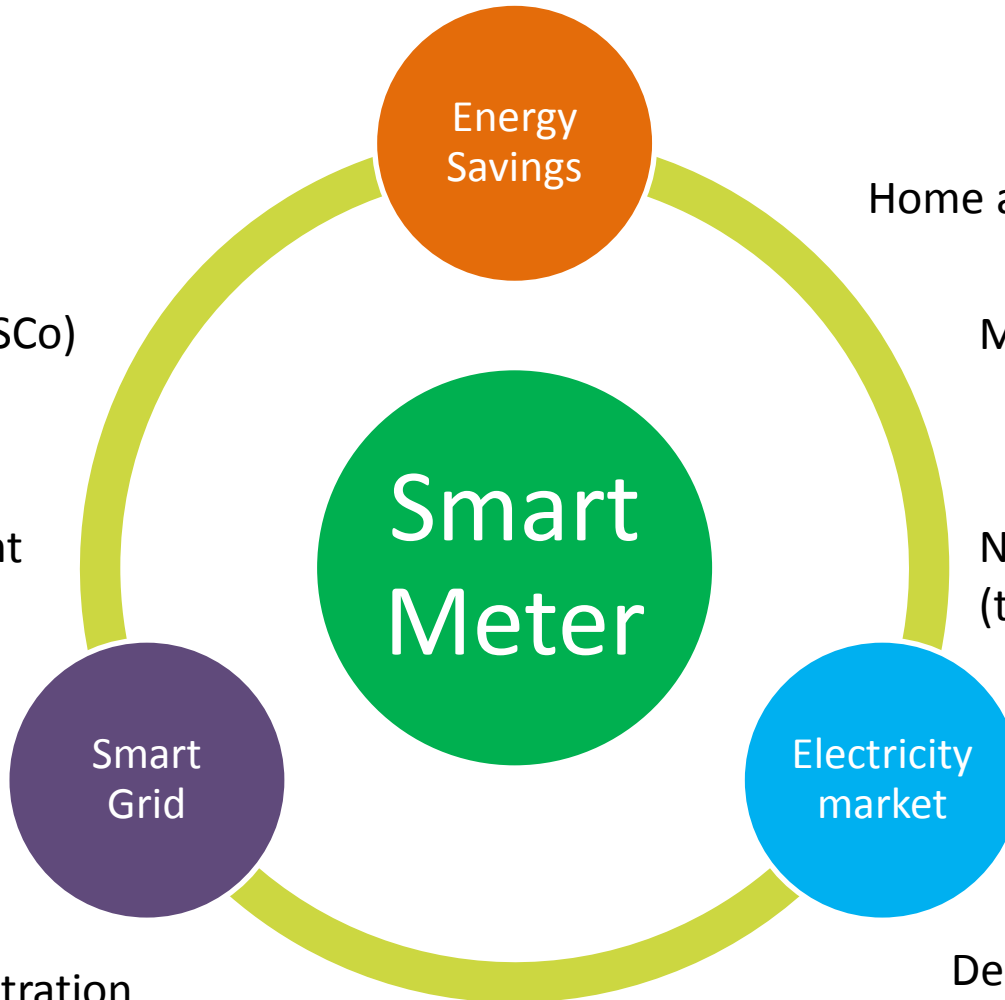
Smart
Grid

Network administration
(power limitation or not)

Demand response
(technical)

Network management
(accurate data)

Remote consumption
feedback & advice (ESCo)



CONTROVERSIES

- Privacy
- Security
- Electrosmog
- Who pays the meter? Who owns it?

Less present:

- Necessity to install a SM in every household.
- Which data are transferred? With which format? Which frequency?
- Danger of making pay the 'real cost of the electricity'



ACTIVE OR PASSIVE USERS?



MANY ASSUMPTIONS

- Consumers want to know more about their bills and the energy prices.
- Feedback is a necessary element to control energy use more effectively: information provided by feedback is clear and self-explanatory.
- People react to external stimuli in predictable ways.
- The transaction costs of getting the right information are low, and cognitive saturation happens rarely.
- When fully informed a consumer makes the best choice.
- Households can control (or manage) their energy consumption through different simple strategies.
- Habits can be changed through awareness rising.
- Once settled, these habits will last.
- Among the overwhelming quantity of products, energy is an issue for households.
- Users are interested by increasingly sophisticated devices.

FEEDBACK STUDIES

- Electricity consumption feedback = 10%, 15%, or even 40% of reduction.

But:

- Who participates?
- Possible for everybody?
- How is an IHD appropriated?
- What do people learn with an IHD?



METHODOLOGY AND RESULT OF 6 LARGE EUROPEAN STUDIES ON FEEDBACK

	Recruitment	Total #	# with SM	Reduction
EDF (EDRP)	Phone. Opt-in	1979	1879	2.3% - 4%
E.ON (EDRP)	Letter (& phone). Opt-in	28450	8055	1.7% - 3.9%
Scottish Power (EDRP)	Visit. Uninformed	3028	1330	No effect
SSE (EDRP)	Different methodologies	27887	7106	2.5% - 3.6%
CER (Ireland)	Letter. Opt-in	5028	3858	2.5%
Intelliekon (Germany)	Letter & phone. Opt-in	2091	1114	3.7%

Comments:

- Reduction for the most efficient combination: SM + accurate billing + advices (+ monitor or additional bill data)
- Reduction for the 1st year (drawback effect)
- Importance of opt-in: does not depend on socio-demo variables or location

ORIGINAL PROTOCOL

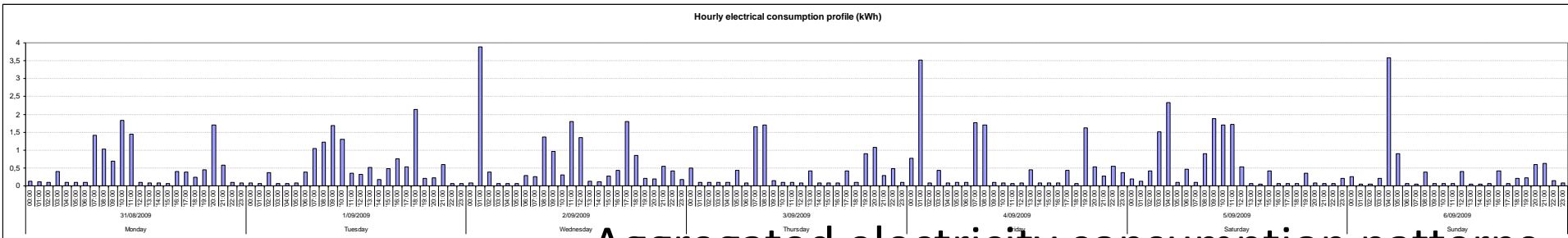
- Qualitative
- Sept. 2009 – May 2010
- Recruitment:
 - 10 through direct mailing
 - 10 through newsletters
 - 1 through a Public Welfare Centre
- Steps:
 - Questionnaire about appliances and uses
 - Electricity Monitor: 4 to 8 weeks
 - Data explained
 - In-depth interview

THE INTERFACE

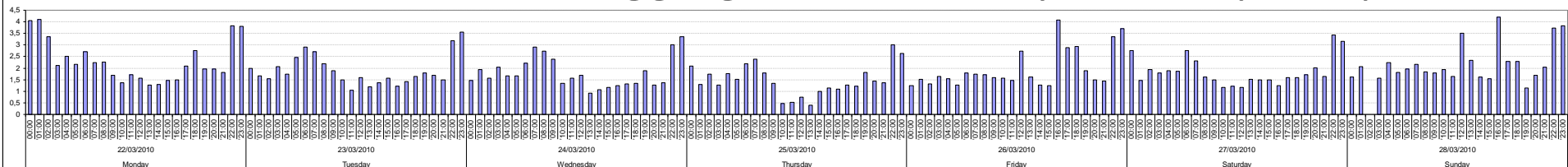


- Aerial icon confirms information is being read from the transmitter
- Indicates the number of sensor jaws installed. For most domestic situations this will be one
- The top line of the display shows you how much energy you're using right now. Test it out by switching a light on and off and watch the figures as they change
- The second line down shows how much money you're spending. It will also change as you switch electrical goods on and off. The figures change automatically to show how much it will cost you per day and per month - if you neglect to turn off your appliances
- The third line shows you how much you save when you turn an appliance off, or spend as you turn it on. It also shows you the equivalent decrease or increase in energy usage
- This graph shows you how much energy you have used between 7am - 3pm during the previous day, 3pm to 11pm the previous evening and 11pm to 7am the previous night
- This shows you your accumulative energy in kWh and scrolls every ten seconds between the last day, the last seven days and the last 30 days. You can also scroll through these using the centre button
- The time and the temperature are displayed at all times.

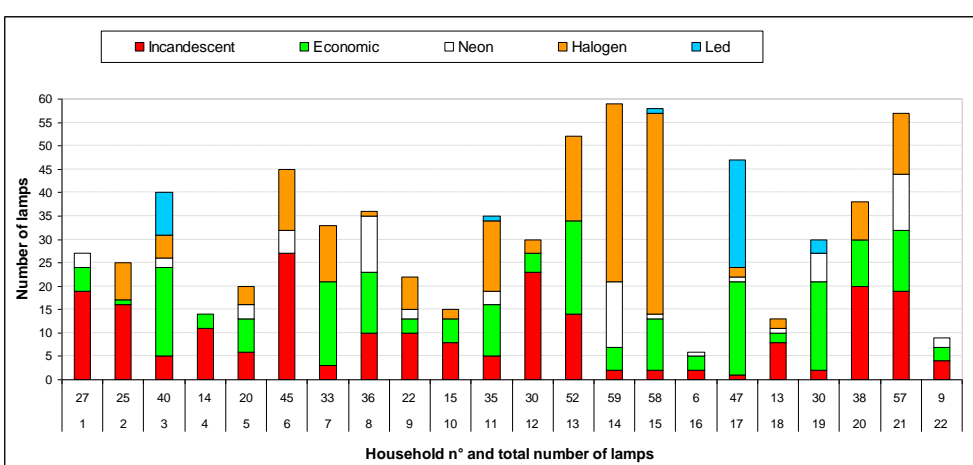
SOME COLLECTED DATA



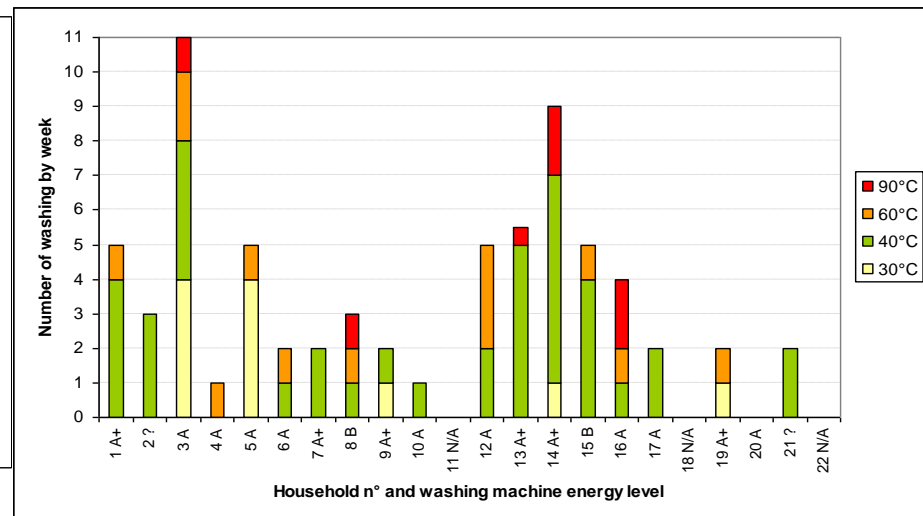
Aggregated electricity consumption patterns



Appliances



Usages

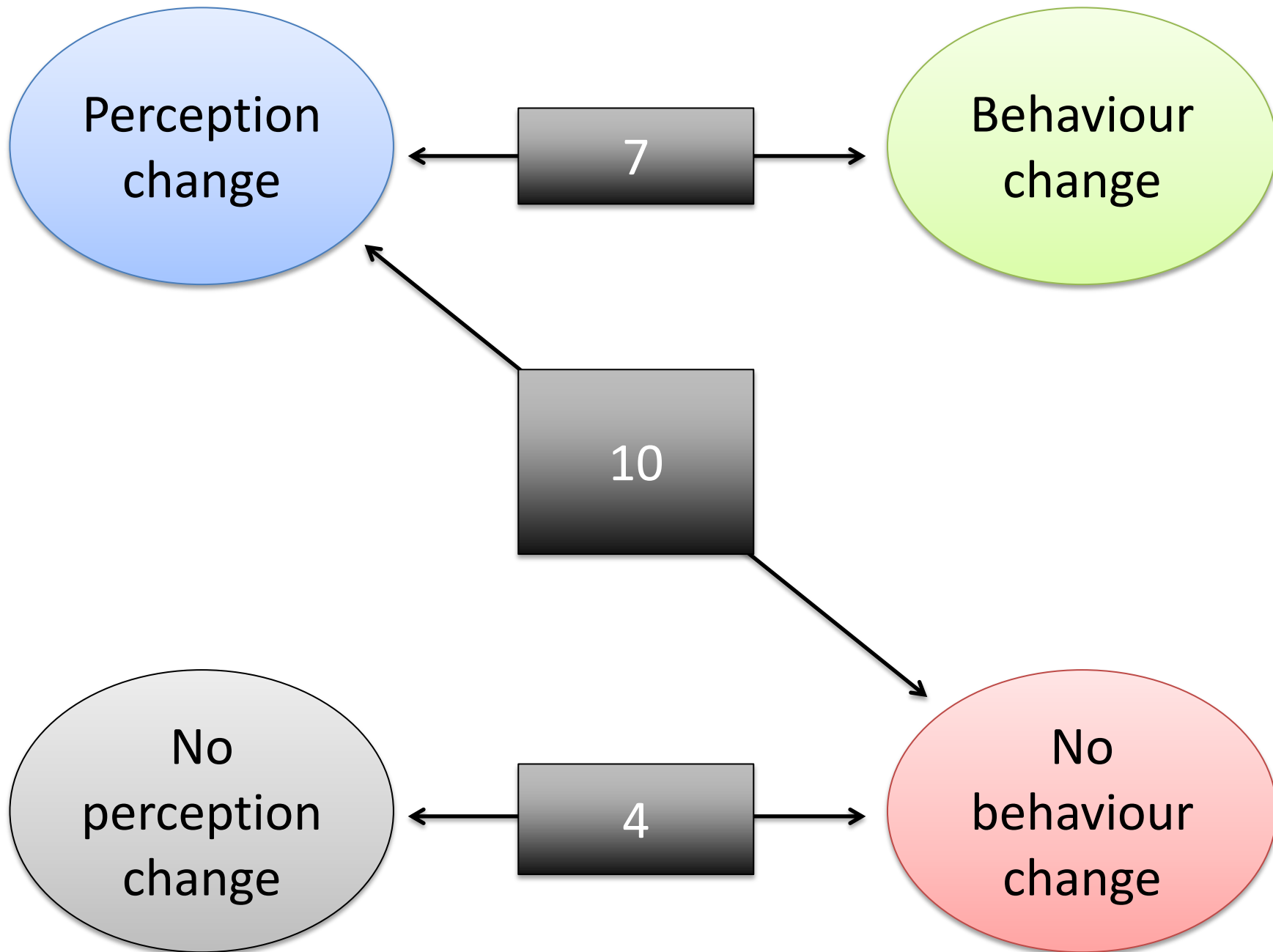


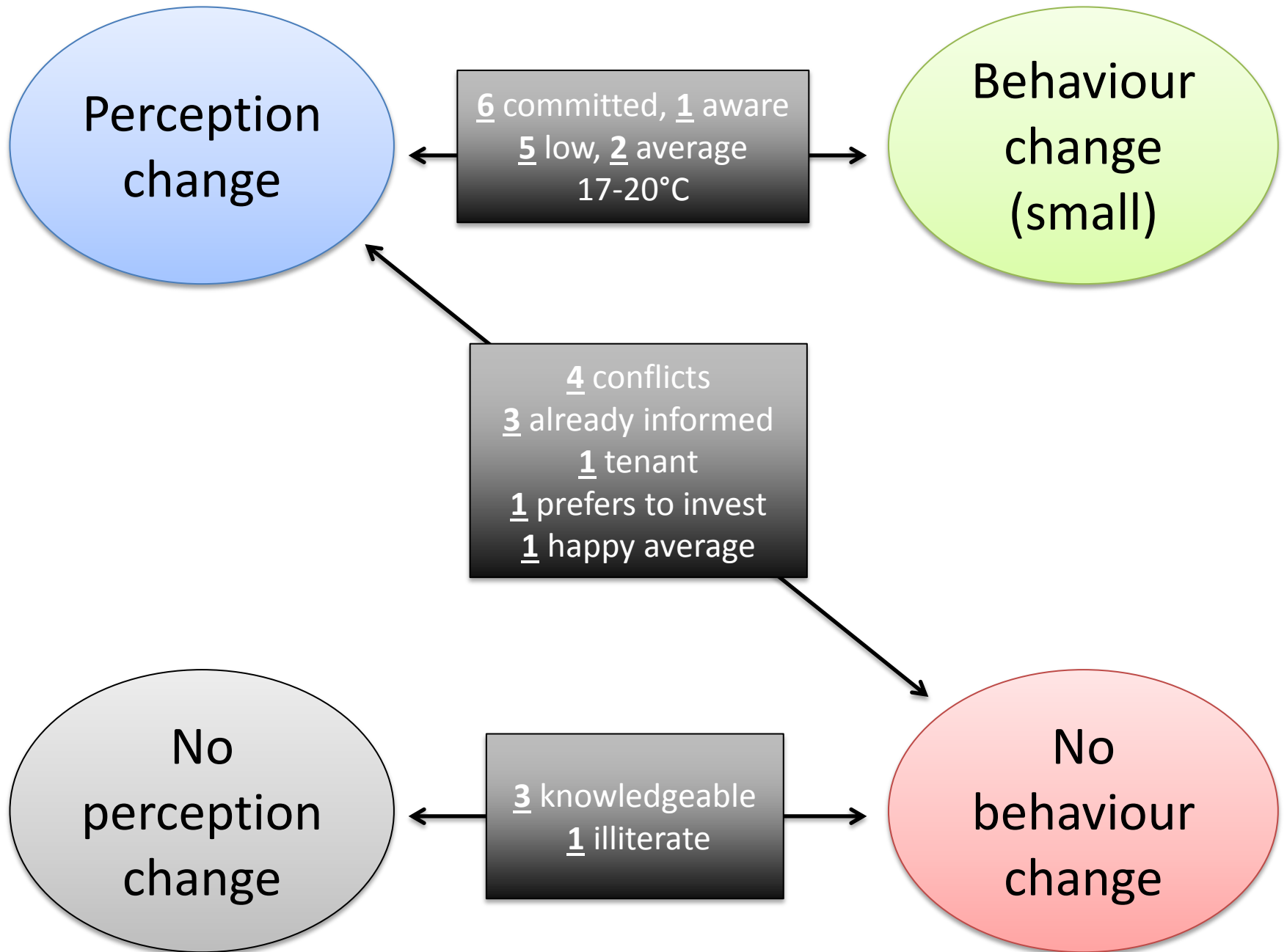
WHAT HOUSEHOLDS LEARN

- Some appliances use a lot of energy (dryer, water boiler, halogens, oven, etc.).
 - “everything that heats up consumes a lot”.
- Some appliances don’t consume much
 - “I realized I can use it more”.
- Committed people track small remaining consumption
 - Zero energy game
- Perception change:
 - variations (peaks when use some appliances)
 - Standby (hidden consumption)
 - Ranking appliances
- Intentions of buying more efficient appliances (or bulbs).
- Longer term effects?

ANALYSIS OF THE 21 RESPONDENTS

- Energy conservation interest: committed (8), aware (10), none (3).
- Energy consumption: low (8), average (10), high (3).
- Change in perception of energy consumption (17).
- Behaviour change: standby (e.g. before going to bed), dryer, kettle.
- Observed wasteful behaviours: heating T°, usual tips.
- Self-declared thrift (16).
- Use of the meter: curiosity (8), check (6), systematic control (3), felt obliged (4).
- Environment & future: SD is possible (14), pessimistic (5).

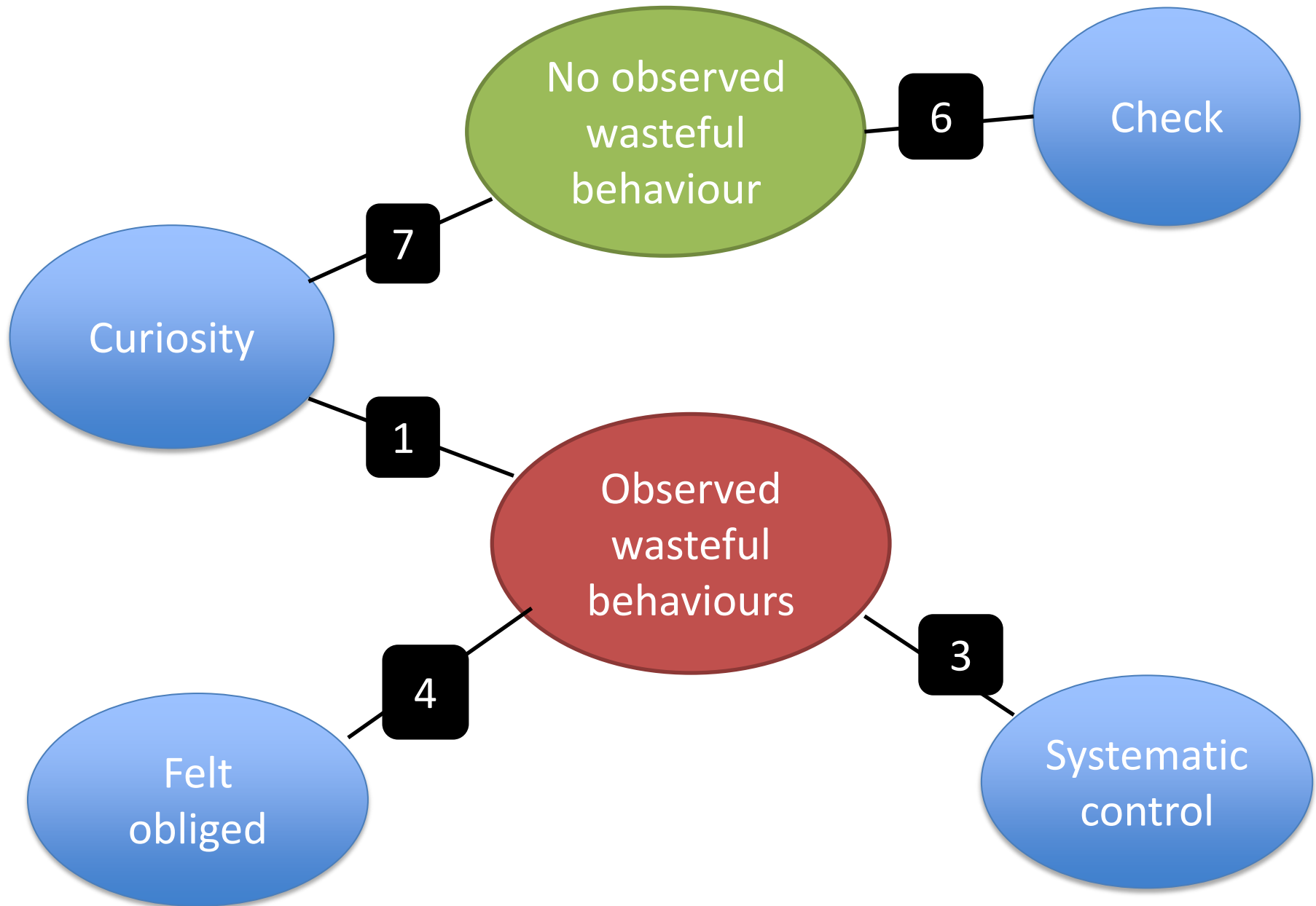




Observed wasteful behaviours (8/21):

- **No behaviour change**
- 4 self-declared thrifty
- Energy consumption: 3 high, 4 average, 1 low
- T° max.: 19-24°C
- Environment and future : 4 pessimistic, 3 SD

USE OF THE METER



LESSONS

- Current feedback yields small changes (non negotiable practices, Strengers 2011).
- Diversity of users: opt-in is determinant
- Appropriation of the IHD is a process (Liverstone 1993, Pantzar 1997) that depends on:
 - Pre-existing competences and practices
 - Interest (financial, environment, control, etc.)
- ABC grammar (Shove 2010) : causal relations; a priori variables.
- Objects should evolve with usages.

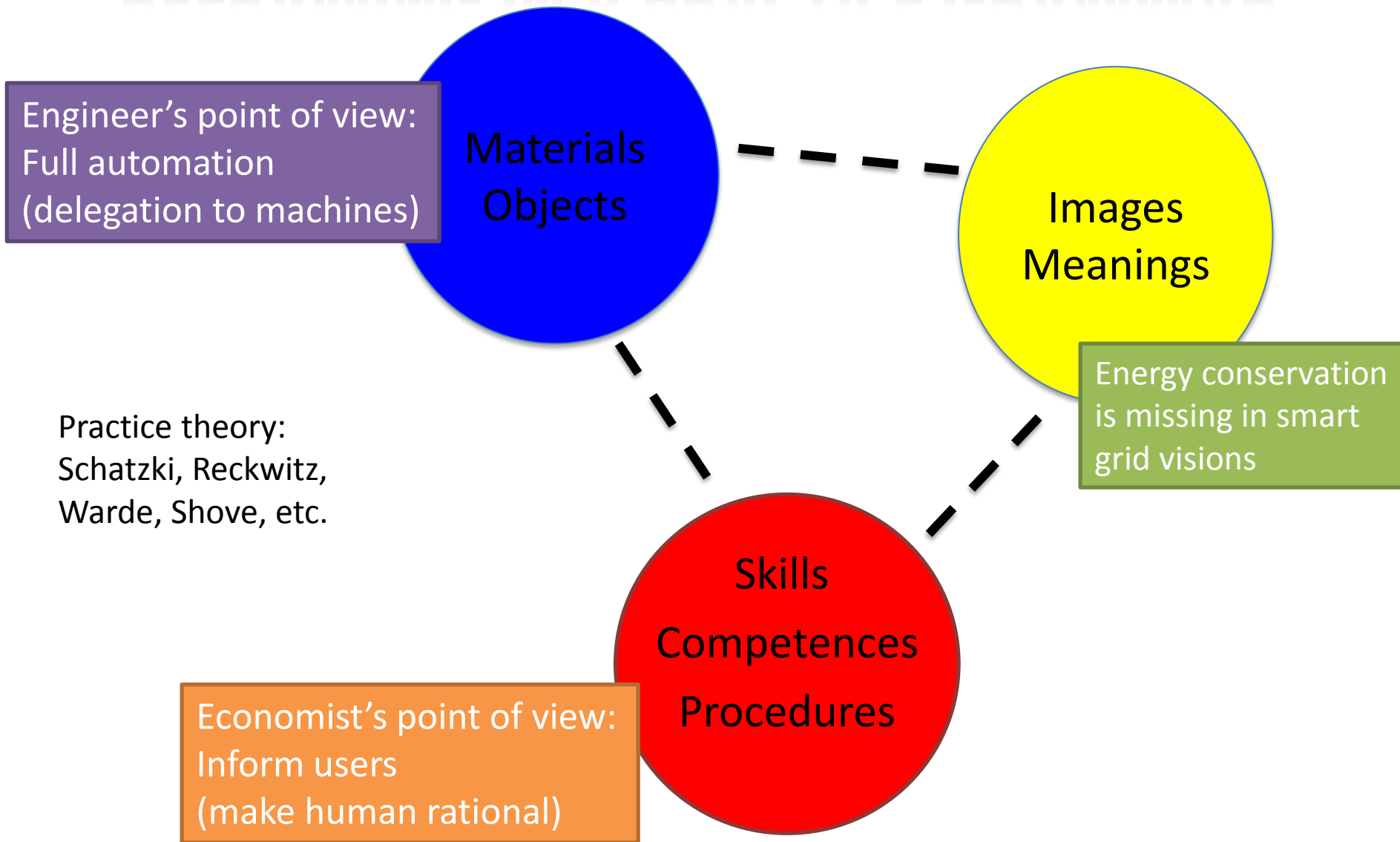
IS ENERGY SAVING A PRACTICE?

- Dispersed practice ? (Schatzki 1997)
 - For some households
 - In a narrow and normative frame
- IHD is domesticated as a check of existing practice
- For other households: add information but not relevant to practices.

Conclusion: IHD does not create new practices

→ Energy saving is not a practice as an entity.

REFRAMING IN A PRACTICE GRAMMAR



Conclusion: in search of experiments in which objects are not thought as the main vector of change but participate to the socio-material reconfiguration (Marres 2012)

THANK YOU FOR YOUR ATTENTION!

More information:

- G. Wallenborn, M. Orsini & J. Vanhaverbeke (2011), « **Household appropriation of electricity monitors** », *Journal of Consumer Studies*, 35 (2011) 146–152.
- F. Klopfert & G.Wallenborn, **Empowering consumers through smart metering**, a report for the BEUC, the European Consumer Organisation, December 2011.
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