

# HOPES: an empirically-informed practice-centric approach to model the dynamics of household energy use

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# HOPES: an overview

**UNDERSTANDING  
THE DYNAMICS OF  
HOUSEHOLD ENERGY  
USE**



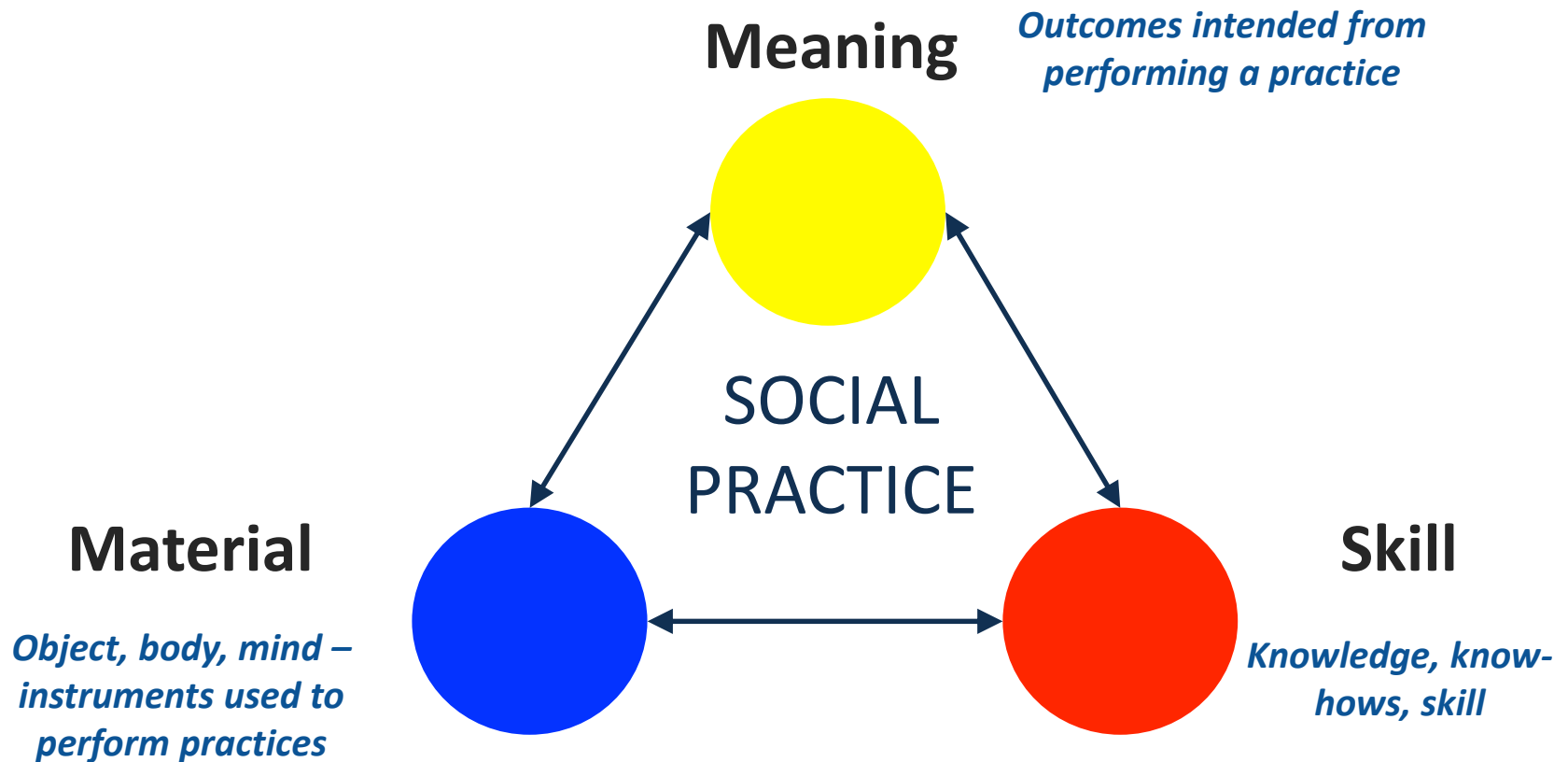
Research exploring the complex nature of household energy use to benefit consumers and meet the government's 2050 energy reduction targets

# A practice theory approach to model the energy use of households

- A move from Individuals (individual choice/nudges) to Practices; the unit of analysis is practices
- A body of work collectively referred to as theories of practice or social practice theory
- Individuals might choose which practices to perform, but their choices are constrained by societal structures that shape and are shaped by the outcomes of human action
- Focus is on the performance, history and trajectories of practices

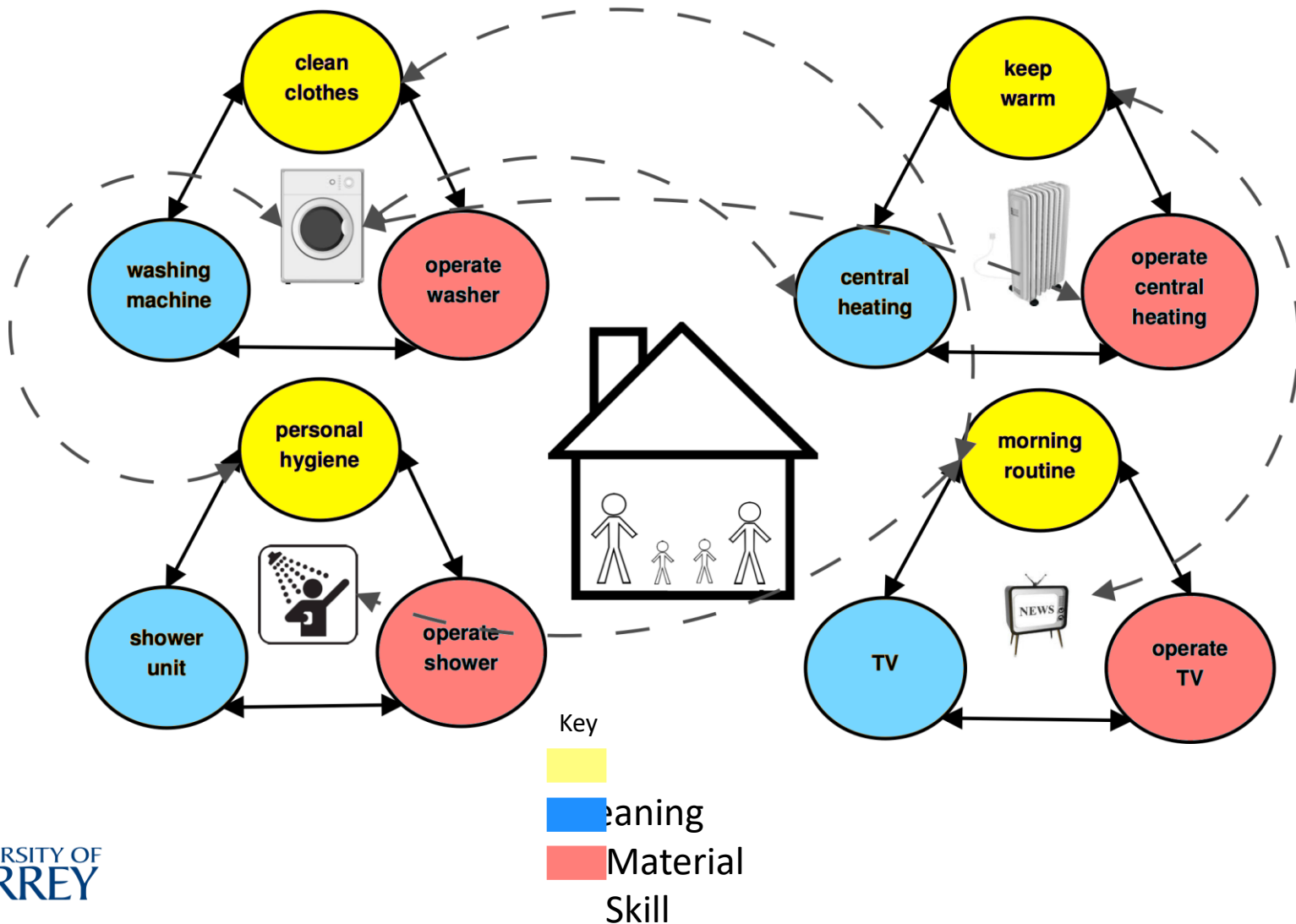
# Social practice theories:

## Concept 1

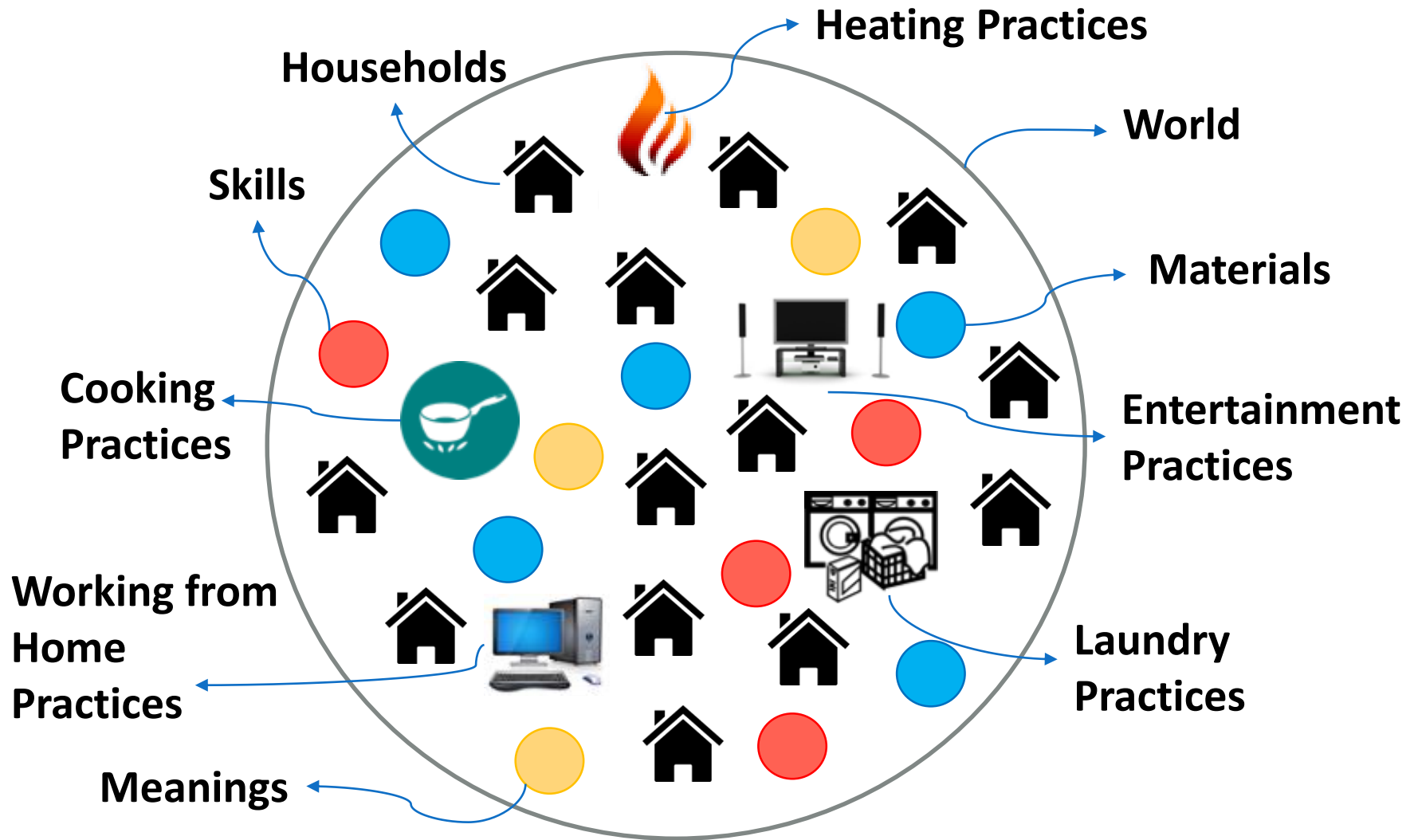


# Social practice theories:

## Concept 2

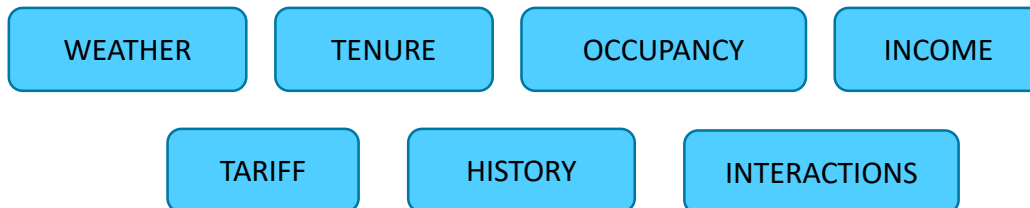


# The HOPES model



# Qualitative Data Collection

- Qualitative research is vital to understanding people's meanings behind their actions
- We used the walking interviews method for collecting data on the energy use practices of households
- Interview protocols contained an outline of topics to be discussed and some open-ended questions to allow participants to respond freely and fully
- Interviews conducted in over 60 households in the UK
- Information from a survey used to complete the household narratives
- Conducted a thematic analysis of the interviews to draw out common experiences and ideas across household narratives; analysis was based on the topics:



# Examples of participant responses

*“...she’s usually too cold and I’m usually too warm. So you know, I’ll tell her to **put extra sweaters on** [...] So we don’t really have **thermostat wars** anymore but we used to.”*

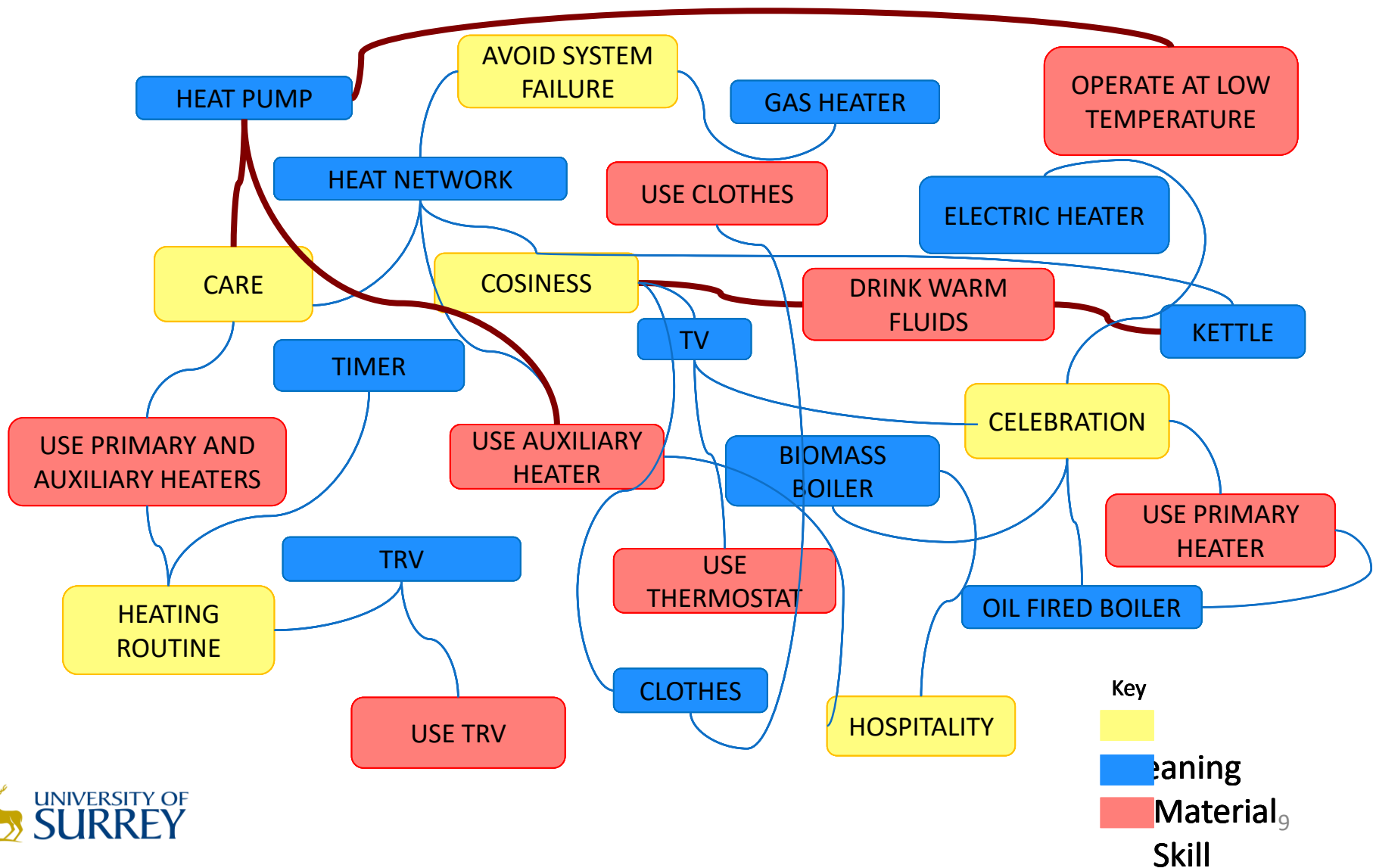
*“Well for the difference in price we might as well get the **Nest**. It probably won’t save us a huge amount of money but it’s a gadget, and **we are gadgety people**, so...(laughs)”*

*“if you get cold, get up and move around a bit, that’s the logical thing. **Go for a walk**”*

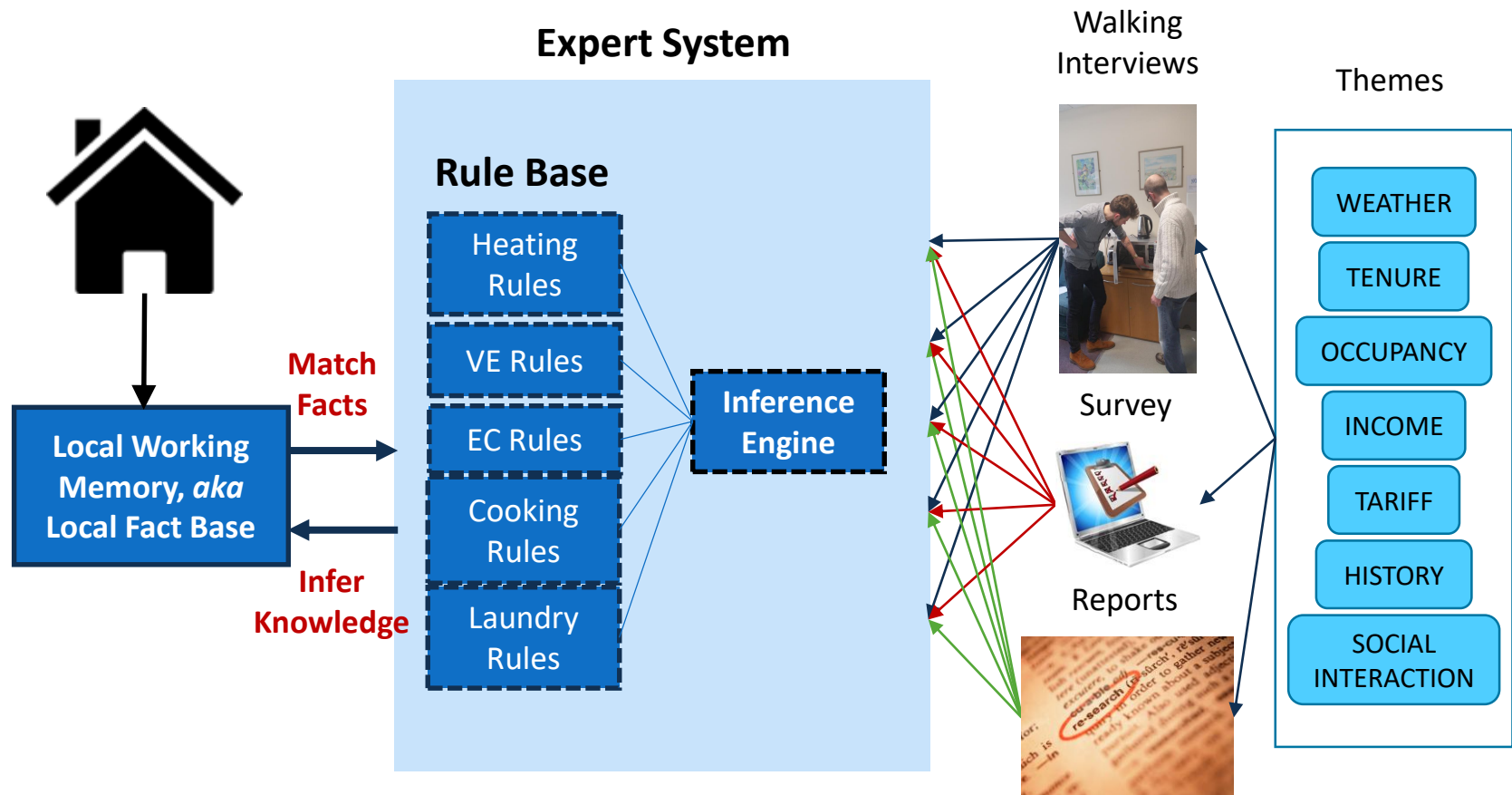
*“my husband now drinks more tea [...] our energy use might have changed; he’s been **working at home more**”*



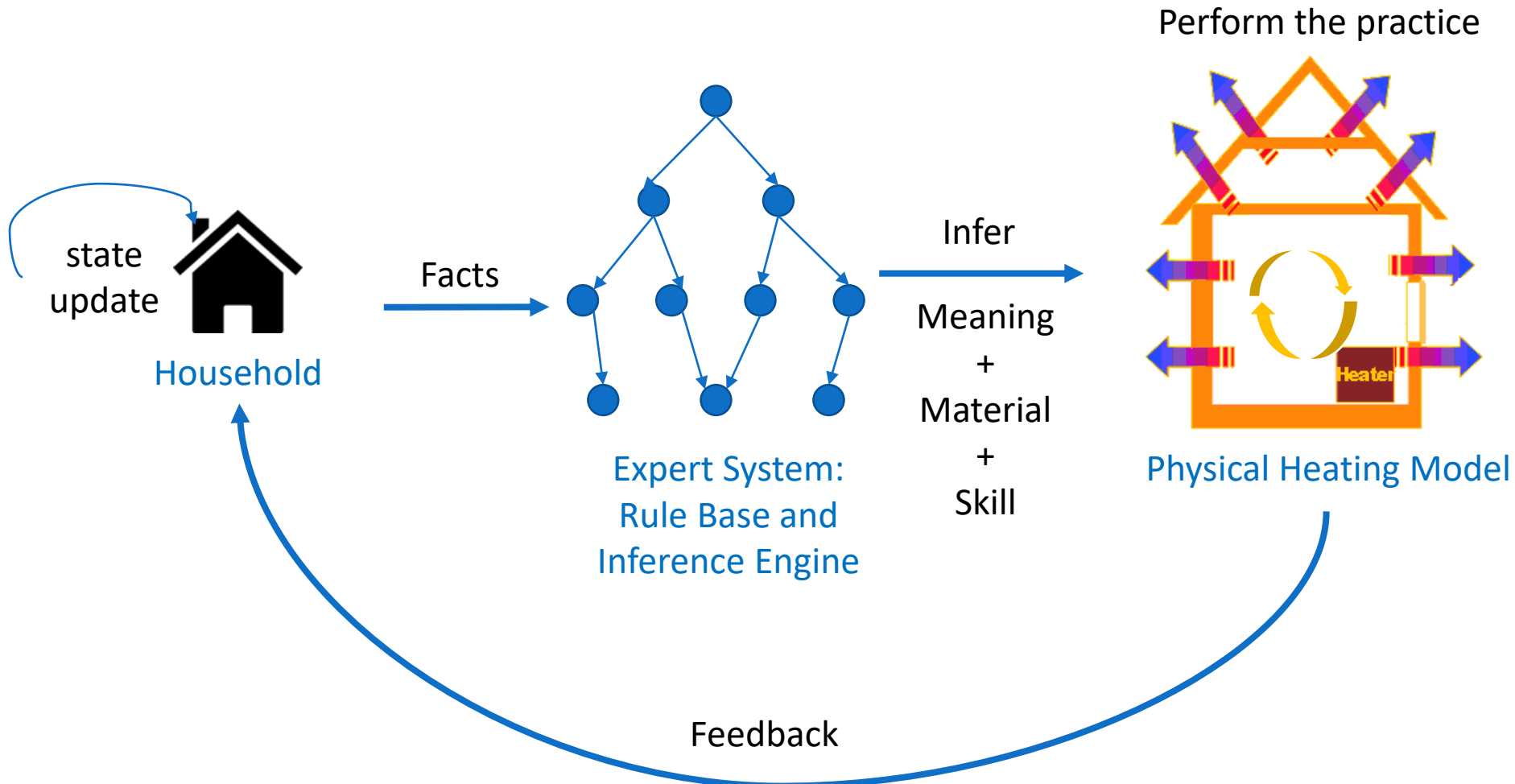
# Visualising the links between elements



# Bringing it all together in an expert system

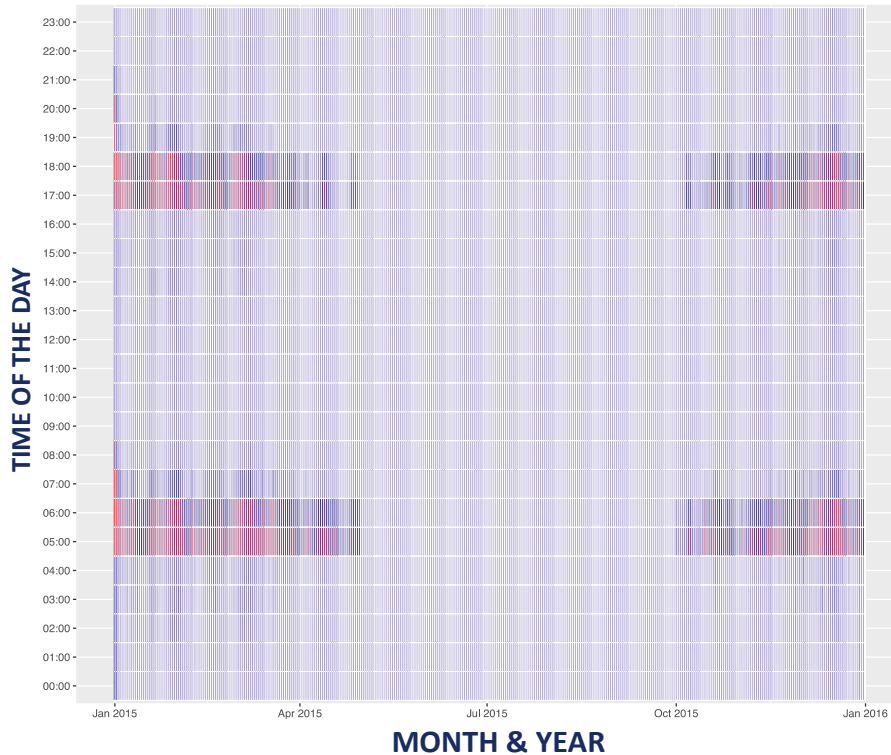


# HOPES: The case of Heating Practices

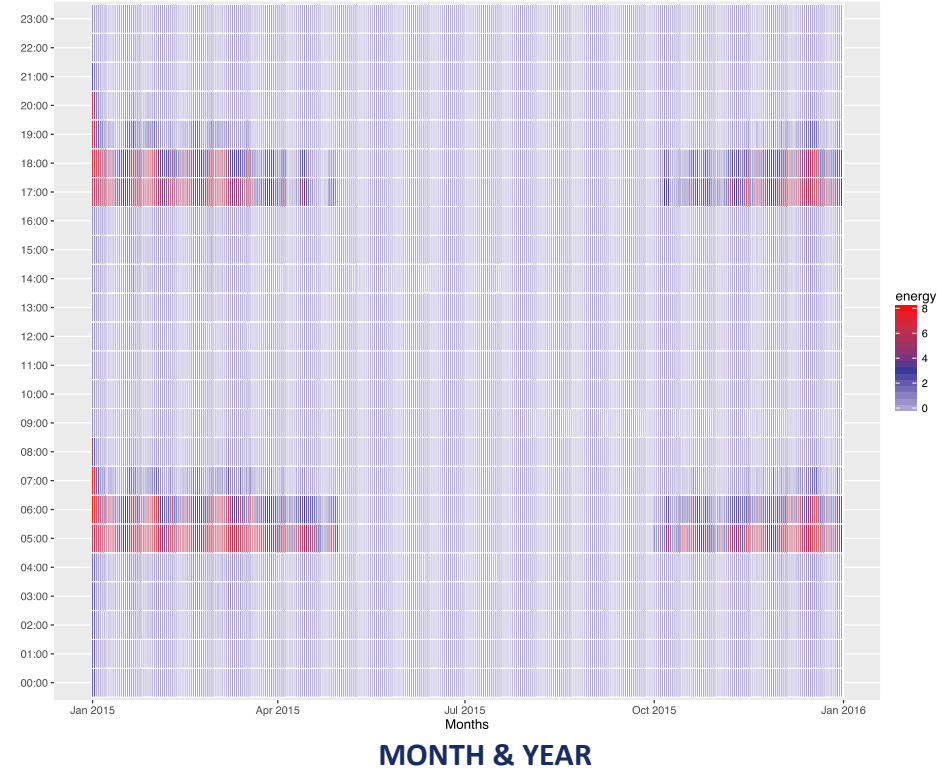


# Heating Profiles of Households

**Flat Rate Scenario**



**Price-based Demand Response Scenario**



*Although both scenarios produce roughly similar profiles of annual heating demand, the price-based demand response scenario results in an overall increase of demand, which happens because consumers are (in a sense) passively encouraged to use heating when the tariffs are low*

# Deriving a practice-centric understanding of the demand profile

## Flat Rate Scenario



*Responding to Peak Prices makes Heating a Necessity rather than a Comfort at other times of the Day*

## Meaning = Cosiness

### Price-based Demand Response Scenario



# Conclusion and Next Steps

HOPES is an empirically-based practice-centric model of energy use in households, which

- Is an offering to overcome criticisms of the abstract nature of social practice theories
- Has an expert system approach to improve model transparency and tractability
- Is a logical tool to uncover some of the non-rational, routine and highly contextualized motivations for energy use in households –

## ***Demystifying the Demand Sector***

Next Steps:

- Extend the model to other common household practices, namely Cooking, Laundry, Visual Entertainment & Electronic Communication
- Explore the coexistence and causal links between practices
- Analyse the impact of the coexistence of practices on energy use

# Thank You



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