



DEPARTMENT OF  
**COMPUTER  
SCIENCE**

# Disentangling Privacy in Smart Homes

Position paper

Martin J. Kraemer and Ivan Flechais  
Department of Computer Science  
University of Oxford

# Privacy in Smart Homes

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## Socio-Cultural Context

Social order, moral ordering [1] and social settings [2] evolve for different forms of cohabitation.

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## Technology

Technology in the home is increasingly unobtrusive, invisible, and disrupts physical borders.

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## Privacy

Existing mental models of devices, usage expectations, and privacy practices. Influenced by markets, policy, and public debates.

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## *Contextual Integrity*

“Model of the structure of people’s expectations in relation to the flows of information in society” [3, p231]

# Outline

**Research Question**     How do *privacy practices* in the context of smart homes change over time?

## Approach

A longitudinal panel study with interventions to investigate the processes of formation and development of privacy practices in the home.

## Contribution

A better *understanding* of and *enable design* for users' privacy practices, considering sociological and technological influences

# Empowering Users' Privacy Practices

## Socio-Cultural Perspective

Grounded Theory



Interviews  
(n=36)

Survey  
(n=852)

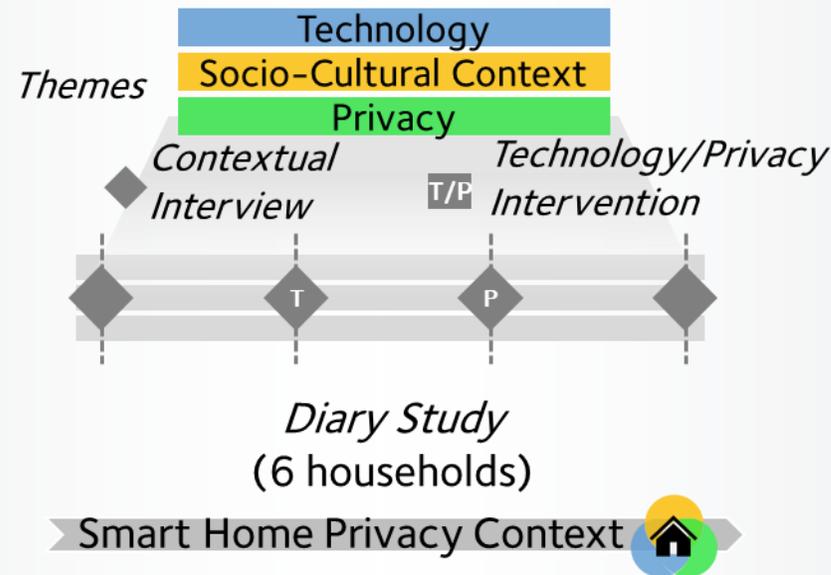
Socio-Cultural Context



**RQ** – What are the influences of *socio-cultural* factors on the use of smart technology in the home?

## Disentangling Privacy

Longitudinal Study



**RQ** – How do *privacy practices* in the context of smart homes change over time?

## Dissemination of Results

Expert Sessions



Focus Groups & DELPHI method  
(n=50)

Actionable Recommendations

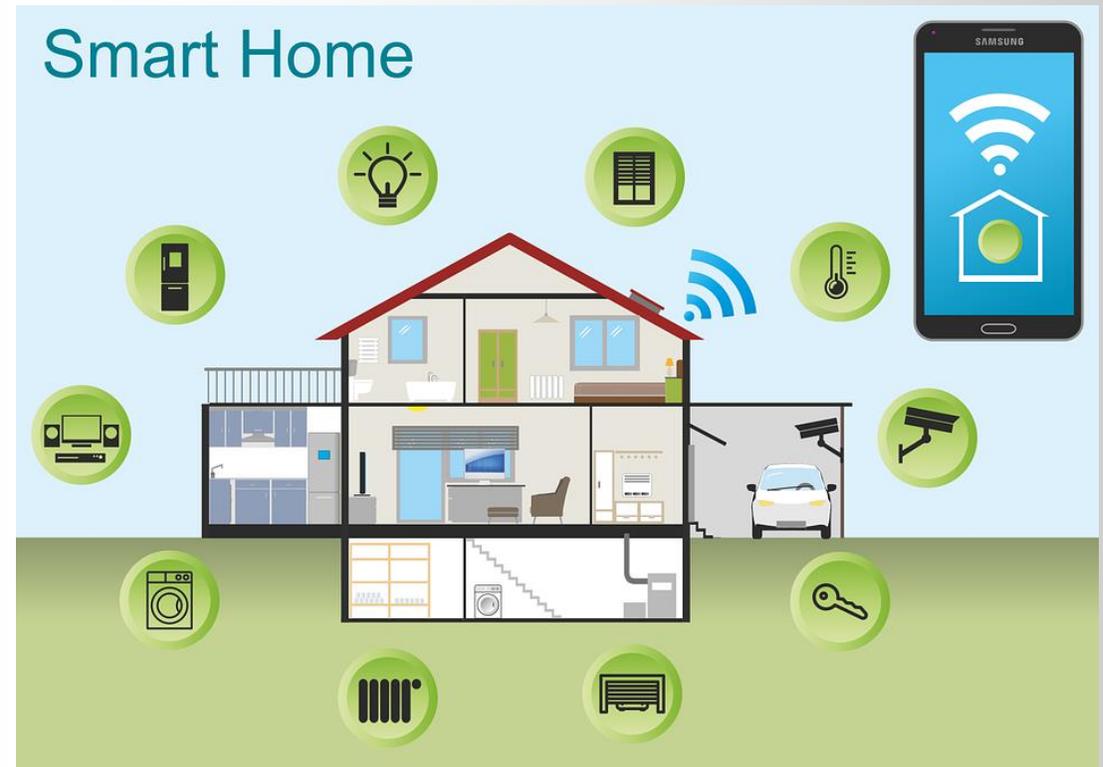


**RQ** – How can the resulting model improve *product design* and *privacy practices* in the context of smart homes?

# Related Work

## On privacy in smart homes

- Apthorpe et al. [4] discovering informational norms in the home
- Burrows et al. [5] provide a home and health care perspective
- Zheng et al. [6] elicit use expectations of privacy in smart homes
- Trust and privacy concerns are reported as challenges to adoption, e.g. [7]



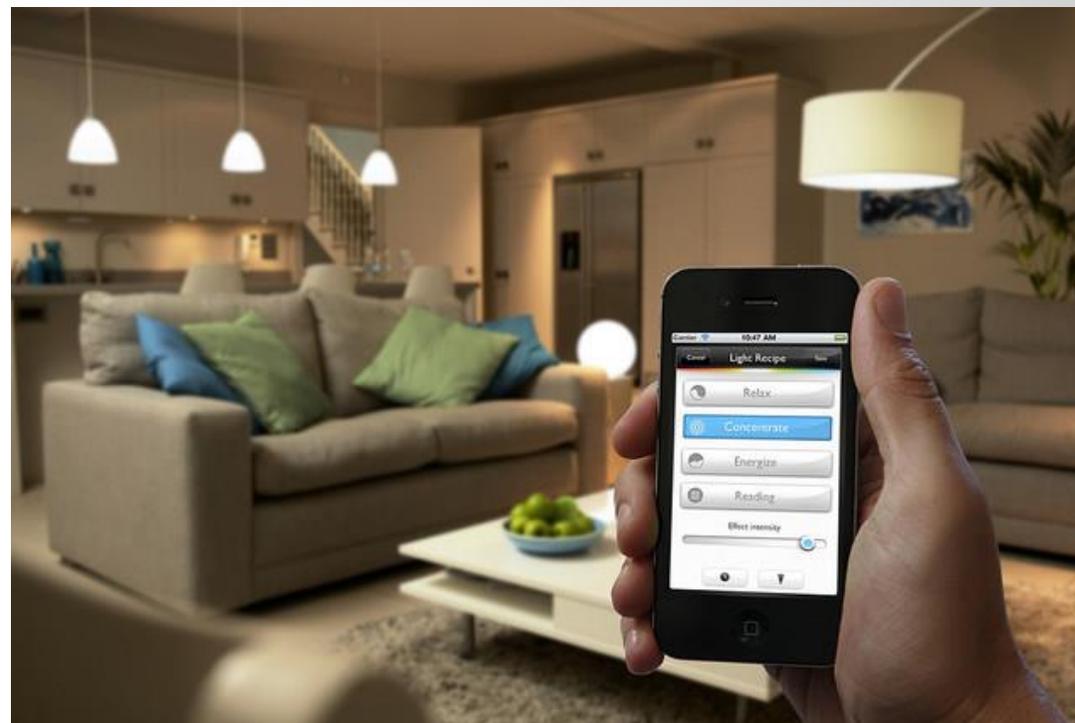
# Exploring Social Order and Device Usage

## Preliminary results\*

- Interviews – *life-styled, shoe-horned, or limited* socially embedded processes of IoT device appropriation
- Survey – *responsibility and care* at the intersection of social order and technology usage behaviour

## Summary of findings

1. Varying perceptions of responsibility and care – traditional gender roles and biases
2. Dichotomy of usage expectations and provided functionality
3. Self-agency in light of anticipated and unanticipated behaviour
4. Assumed or articulated – perspectives on socially negotiated device usage



\* As of Sep 2019 from our mixed methods exploration of smart home device usage - interviews (n=36) and survey (n=852)

# How do *household privacy practices* change over time?

- Practices are results of
  - social order formed through negotiation and
  - users' expectations, norms, purposes and goals
- Practices evolve over time
  - and are influenced by technological advances and users' mental models
- Practices are shaped by
  - attitudes and preferences established through privacy debates and available controls



<https://www.standard.co.uk/lifestyle/forty-and-flatsharing-in-london-6448510.html>

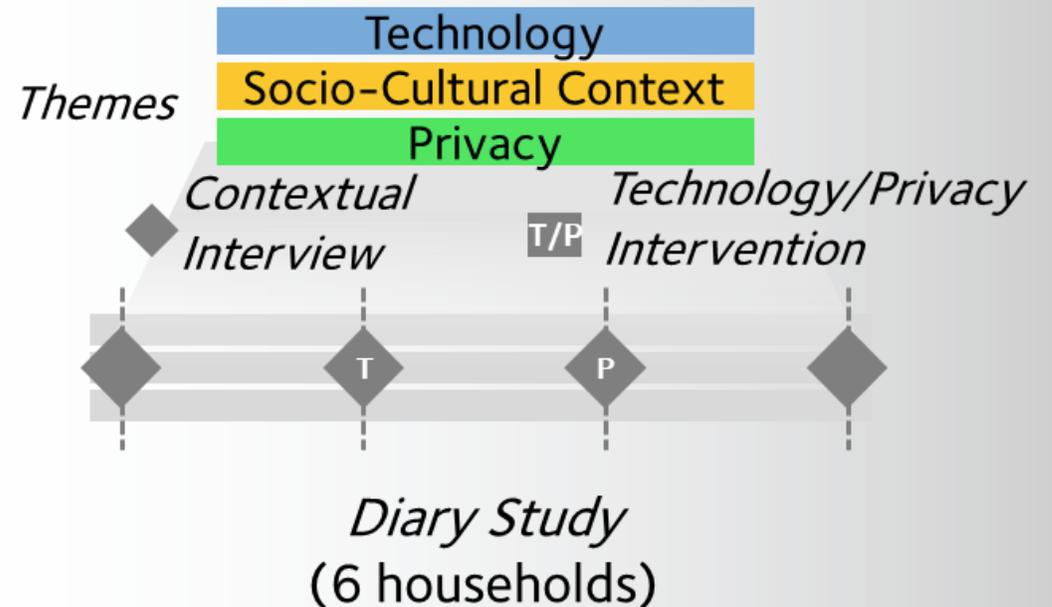
# Disentangling Privacy

## A new methodology

- Combining a diary study with contextual interviews and interventions
- Elucidating qualitative with quantitative data

## Phases

- 1) Device appropriation  
>> Technology Intervention
- 2) Mental models  
>> Privacy Intervention
- 3) Choice architectures and options



# Summary and Reflections

## Discovering Contexts in the Smart Home

- Qualitative and quantitative exploration of privacy practices embedded in social order
- Households as (*in-*)groups with inhabitants as members
- Teleological structures in light of technological and social developments; topical debates and mental models

## Normative Exploration

- Understanding “relevant contextual values” [3, p166] of home practices to inform arguments of moral legitimacy

## Empowering Users

- Combining thorough understanding of contexts and normative values to empower users

# Thank you!



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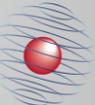


**Martin J Kraemer**  
*Doctoral Researcher*

Department of Computer Science &  
Centre for Doctoral Training in  
Cyber Security

W: <http://www.martin-kraemer.net>  
E: [martin.kraemer@cs.ox.ac.uk](mailto:martin.kraemer@cs.ox.ac.uk)

**EPSRC**  
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