

# The intersection of EU Data Protection Law Reform and everyday ambient computing design: challenges and opportunities

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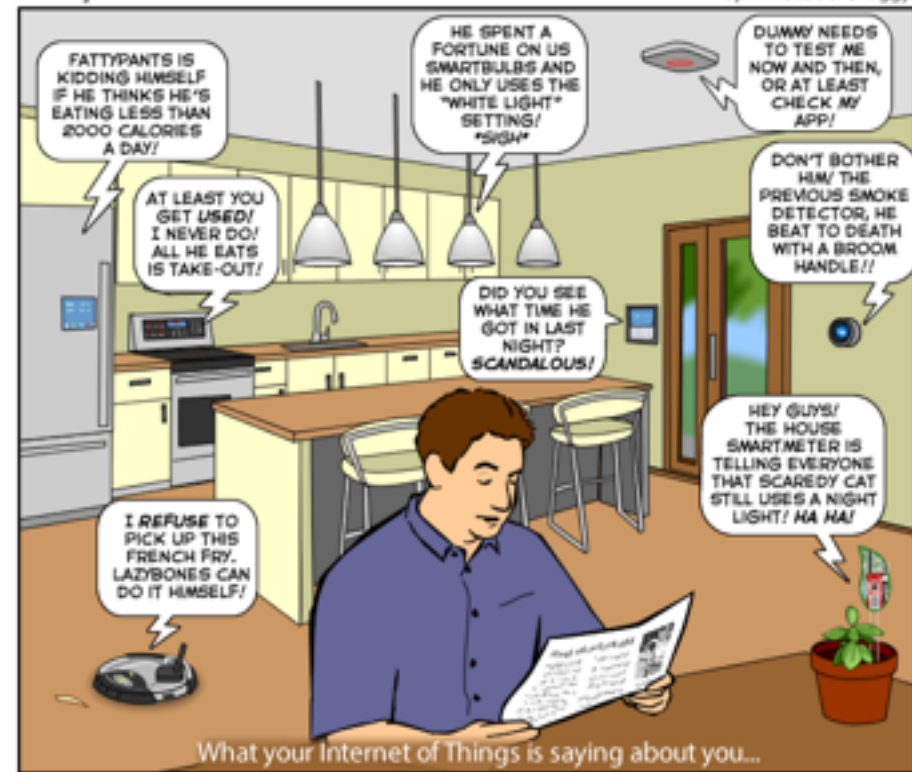
# Outline

## Legal Challenges (or opportunities?)

- Ubicomp – ‘out of the lab’ & ‘into the wild’
- **Consent** - Informed, Explicit
- **Data Protection by Design**
- Consent, preserving human agency & accountability as **opportunities** for designers to address
- DP compliance as requirement of good HCI/system design  
**e.g. alongside usability, intuitiveness**

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# Ubicomp 'in the wild'

- Ubicomp?
  - *"Computers that weave themselves into the fabric of everyday life until they are indistinguishable from it"* (Weiser 1991)
    - **Embedded** in daily routine
    - Seamless interactions between computer & human post-PC HCI
  - *"Unremarkable"* & *"invisible in use"* (Tolmie et al 2002)
  - Ambient data collection of **human data** - for contextually aware services

# Examples: Public and Private Setting

- Home automation:
  - *IoT - wired toasters, fridges & speaking to each other*
  - *Energy: Smart meters; NEST Learning thermostat; Smart Grid - Agent based home energy management*
  - *Public Lighting; smart billboards*
  - *Quantified Self - Smart scales / Fitbit*
- Ubicomp 2.0
  - *Greater agency*
  - *Embedded/wearable*
  - *'knowing' by inference*
  - *linked up communication*





# Designing for Consent in Europe

## *Current:* **Article 2 EU Data Protection Directive 1995**

'freely given', 'specific' and 'informed' indication to processing – 'explicit' if sensitive personal data.

*Future:* **Article 4(8) EU General Data Protection Reform** – explicit, via a 'statement' or 'clear affirmative action'

*Issue:* Collection across public and private contexts – digital and physical space – intimate spaces – bathroom, bedrooms etc

- How frequently, duration of consent, when best to ask?

# Issues

- Design - How to notify/ask?
  - Sale + service contract with T&Cs does not work
  - New models... Pop ups on screens? Tailored videos (to knowledge level)? Alert sounds? voice feedback? Gaze recognition? Explicit gestures like waves?
- \*\* NEST Protect UI problem - waving
- Challenges:
  - Increased agency/ autonomy - *consent to all unexpected actions?*
  - Communication between devices - *authorise for each device?*
  - Maintaining invisibility/seamless system interactions + obtaining explicit consent = how?



# Purpose Limitation and Profiling

- Article 6 DPD – ‘purpose limitation principle’
- Use not incompatible with original ‘specified, explicit and legitimate’ purposes of collection
- **A29 Working Party Opinion 3/2013** - Big data analytics/targeted advertising in mind.
- If direct impact on individuals, need:
  - a) *opt-in* consent
  - b) data subject access to *profiles* being used to target them
  - c) access to the *decision making criteria* used in developing the profiles



# Issues

- Increase **transparency** of system:
- Allow users to **interrogate** functionality & become more informed - 'black box' not sustainable
- Design for **provenance** of data in decision-making e.g. accountability via metadata
  - *Useful for 'subject access rights' or future DP rights to deletion/portability*
- How can ubicomp systems **support users** to opt in to specific purposes and not others?



# Ubicomp in the real world

- Sustainable growth?
- Lack of public trust?



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# Data Protection By Design

- Cavoukian's principles including:
  - privacy embedded into design
  - visibility & transparency
  - privacy as default
- Article 23 GDPR
  - 'state of the art'
  - 'cost of implementation'
  - 'appropriate technical and organisational measures'
- Who decides limits of these? Different stakeholders, different interests...





# Future Work (1)

- Opportunities for *a priori* design solutions
  - Earlier in innovation process... unlike *ex poste* PIA's
  - 'Value sensitive design' (Friedman 1996) and user centered design/HCI
  - Social values – cultural suitability, psychological well-being, environmental sustainability



# Future Work (2)

- Responsible Innovation Framework (EPSRC)
  - Societal impact of technology, ethical implications
- Exploring the interface of HCI & DP Law
  - Usability, intuitiveness, reliability of system... DP compliance?
  - Empirical studies with different stakeholders - ubicomp system designers/users eg envisioning cards



Thanks for listening  
Feedback & Questions?

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