

User-Centric Regulation for the Domestic Internet of Things

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USER CENTRIC REGULATION (UCR)

- Complexity of regulating emerging tech
- Turn to creators of tech – e.g. PbD
- **Problem: Situate role of IT designers in regulation**
 - **Conceptual Perspectives** – turn to HCI & alignment with IT law
 - **Legal Perspectives** – what HCI concepts offer – case of IoT & PbD
 - **Expert Perspectives** – interviews with leading technologists & IT lawyers
 - **Design Perspectives** – developing & evaluating tool.



Source: INCTA.org



1A. CONCEPTUAL PERSPECTIVES: IT LAW

- **Technology design = regulatory tool** (Reidenberg; Lessig; Leenes; Brownsword etc)
- Broadening of actors/purposes of regulation - Black 'post regulatory state'
 - Designers as new regulators shaping behaviour?
- Design in law – user?
 - Lessig - 'pathetic dots'
 - Murray – 'nodes'
- Inadequate engagement with how users interact with tech in practice?
 - Richer picture vs abstract notions of users
 - A role for HCI?

A Legal Turn in Human Computer Interaction? Towards 'Regulation by Design' for the Internet of Things

38 Pages • Posted: 15 Mar 2016

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Date Written: March 11, 2016

Abstract

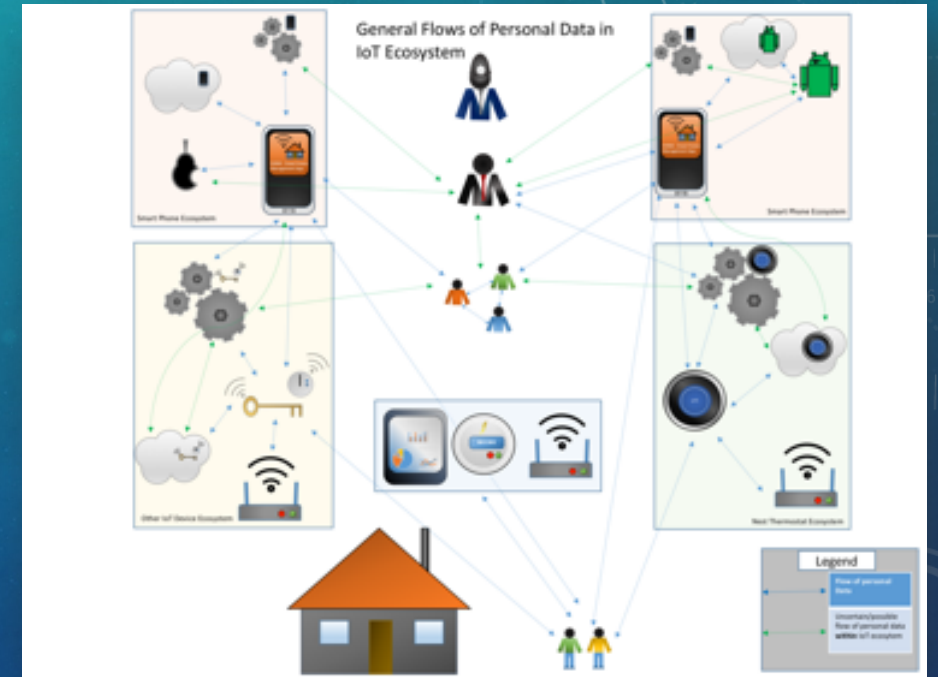
This discursive paper explores the role of law in HCI through the concept of 'regulation by design'. Technology designers are increasingly being called upon by law and policy to act in a regulatory capacity, for example in 'privacy by design'. This is problematic as technology designers are not traditionally involved in regulation and regulators may not fully appreciate what these designers do. We argue that to practically and conceptually achieve 'regulation by design' requires greater understanding of and interaction between the regulation and design communities.

This paper consolidates and assimilates work from the fields of human-computer interaction and technology regulation. It is framed within the context of privacy by design and the Internet of Things. It lays out theoretical tools and conceptual frameworks available to each community and explores barriers and commonalities between them, proposing a route forward.

It contends five main points: 1) regulation by design involves prospective, as opposed to just retrospective, application of law; 2) HCI methods need to be repurposed to engage with legal and regulatory aspects of a system; 3) the legal framing of regulation and design is still anchored in systems theory but human computer interaction has a range

1B. CONCEPTUAL PERSPECTIVES: HCI

- **HCI and Society:**
 - Third wave of HCI (Bødker) cultural/emotional dimensions of computing; Reflective Design (Sengers); responsibility to users (Human Data Interaction)
 - Value sensitive design (Friedman)- Human values in the relationship between user, technology and designer
 - Extend to legal issues too?
- **User Centric Focus:**
 - HCI - range of tools and approaches to understand user interactions with technology in context
 - Design ethnography, participatory design with users – Scandinavian School



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1C. ALIGNMENT: USER CENTRIC REGULATION

- **Explicit Alignment of IT law and HCI:**
 - Structuring reflection and action by designers
 - Sensitise to nature of legal and ethical responsibilities to users.
 - Earlier appreciation of legal dimension – requires mutual support.
- **Legitimacy through User Proximity**
- **Legal Values, Ethics and Responsibility**
 - From human values in HCI to legal values.
 - Beyond compliance - ethical concerns.

Ethical Dimensions of User Centric Regulation

CEPE/ETHICOMP 2017, Values in Emerging Science and Technology, University of Turin, Italy June 5-8

15 Pages • Posted: 2 Feb 2017 • Last revised: 12 Feb 2017

[Lachlan Urquhart](#)

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Date Written: February 2, 2017

Abstract

In this paper, we question the ethical role of information technology (IT) designers in IT regulation. We situate how designers can respond to their ethical and legal duties to end users. We focus on how they mediate user activities through IT design and their wider responsibilities to act in an ethical manner as points for reflection. We illustrate our arguments through the emerging technological setting of smart cities. We use our concept of user centric regulation (UCR) to frame our ethical analysis of what a closer alignment of IT design and regulation could mean. Our concept asserts that human computer interaction (HCI) designers are now regulators and as designers are not traditionally involved in the practice of regulation, meaning their role is ill-defined. Designers need support in understanding what their new role entails, particularly managing ethical dimensions that go beyond law and compliance. Our conceptual analysis assists in this regard by consolidating perspectives from across Human Computer Interaction, Information Technology Law and Regulation, Computer Ethics, Philosophy of Technology, and beyond.

Keywords: smart cities; digital ethics; responsible innovation; value sensitive design; user centric regulation; technology regulation; internet of things

2A. CASE STUDY: UCR AND THE INTERNET OF THINGS

- **Trajectory:** from Ubicomp, Pervasive, Aml, AAL, Smart Homes, etc...now IoT
- **Risk of Visions:** Engineering challenges - neglect the present and interests of users...eg seamless networking
- **Applications:** energy...security...lighting...health e.g thermostats, smart meters, smoke alarms, lightbulbs, ; fridge?
- **Setting:** mundane, everyday, augment routines...complex social space of home vs invisible in use/seamlessness
- **Creative Dimensions of IoT:** experiences, tracking story of objects – guitars, books, Warhammer etc



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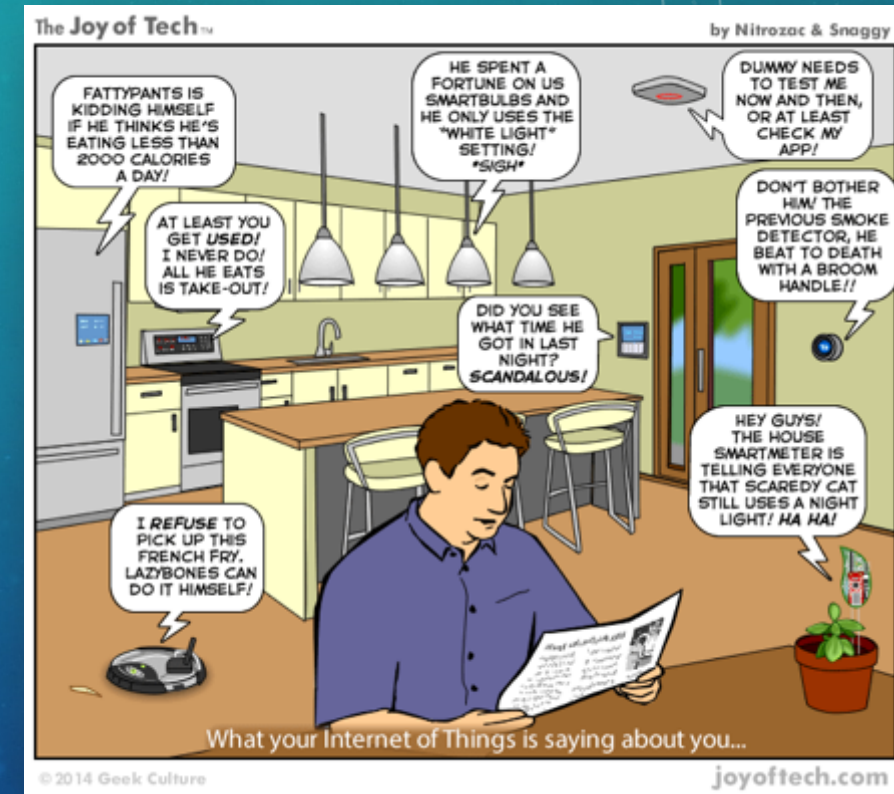
2B. FUZZY PRINCIPLES

- **No Canonical Vision**— survey of reports eg ITU; Cisco; A29 WP; IETF etc
 - **Remote controllability & automation** (e.g. via apps)
 - **Constant connectivity and networking** - for data transmission & service provision (e.g. cloud backend, databases)
 - Ecosystem of stakeholders, incl. **third parties** & data **flows**
 - Physical objects **ambiently sensing & embedded** in social and physical the environment
 - With or without **human input** (lack of UI)



2C. REGULATORY CHALLENGES OF IOT

- Detailed inferences about everyday life
- Limited transparency of data flows
- International data transfer (cloud)
- Insufficient user control (lack of UX)
 - Heterogeneity of device interfaces
 - Control over access to data
- Data repurposing



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2D. SOLUTION: PRIVACY BY DESIGN

- Legally: EU GDPR (2016) Article 25
- **Technical and organisational measures** of state of art; costs; severity of risks
- Historically?
 - Cavoukian; Usable Privacy; Privacy Engineering
- Practically - Tools to Support Designers?
 - *“whereas for lawyers PbD seems an intuitive and sensible policy tool, for information systems developers and engineers it is anything but intuitive”* (Birnhack, Toch and Hadar)
 - *“Fostering the right mind-set of those responsible for developing and running data processing systems”* (Jaap Koops and Leenes)
 - Need cross disciplinary response...

New Directions in Information Technology Law: Learning from Human Computer Interaction ☆

International Review of Law, Computers and Technology, 2017, Forthcoming

36 Pages • Posted: 8 Nov 2016 • Last revised: 15 Jan 2017

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Date Written: November 7, 2016

Abstract

Effectively regulating the domestic internet of things (IoT) requires a turn to technology design. However, the role of designers as regulators still needs to be situated. By drawing on a specific domain of technology design, human computer interaction (HCI), we unpack what an HCI led approach can offer IT law. By reframing the three prominent design concepts of provenance, affordances and trajectories, we offer new perspectives on the regulatory challenges of the domestic IoT. Our HCI concepts orientate us towards the social context of technology. We argue that novel regulatory strategies can emerge through a better understanding of the relationships and interactions between designers, end users and technology. Accordingly, closer future alignment of IT law and HCI approaches is necessary for the regulation of emerging technologies.

Keywords: Algorithms, IoT, Trajectories, Provenance, Affordances, Right to Be Forgotten, Human Computer Interaction, IT Law, Theory, Systems Theory



2E. USER CENTRIC REGULATION FOR IOT

- **1) Right to be Forgotten and Object Provenance**
 - Archiving - Carolan/W40K/TOTeM – object centric narrative
 - Balancing these interests - RTBF vs object memories
- **2) Trajectories and Consent**
 - Benford et al (2011)– designing user experiences
 - Repurpose for obtaining user consent in IoT eg smart thermostat ?
 - space (home – contested social space),
 - actors (third party flows and transient visitors),
 - interface (waves, beeps, feedback);
 - Time (longitudinal)
- **3) Seamful Design & Legal Uncertainty**



3A. PRACTICAL PERSPECTIVES

- Semi Structured Interviews
- 6 tech lawyers
 - 14 years average exp. – partners, associates
 - Expertise: contracts, data protection (DP), intellectual property, e-commerce etc.
- 7 technologists
 - 32 years average exp. – CTOs, chief consultants, MDs
 - Expertise: wireless networking, infosec, data science, telecoms, cloud computing, interaction design

White Noise from the White Goods? Conceptual & Empirical Perspectives on Ambient Domestic Computing

Forthcoming in Edwards, L. Schafer, B. and Harbinja, E. (Eds.) Future Law, EUP, (2017)

39 Pages • Posted: 12 Nov 2016 • Last revised: 15 Jan 2017

[Lachlan Urquhart](#)

Horizon Digital Economy Research Institute

Date Written: November 7, 2016

Abstract

Within this chapter we consider the emergence of ambient domestic computing systems, both conceptually and empirically. We critically assess visions of post-desktop computing, paying particular attention to one contemporary trend: the internet of things (IoT). We examine the contested nature of this term, looking at the historical trajectory of similar technologies, and the regulatory issues they can pose, particularly in the home. We also look to the emerging regulatory solution of privacy by design, unpacking practical challenges it faces. The novelty of our contribution stems from a turn to practice through a set of empirical perspectives. We present findings that document the practical experiences and viewpoints of 13 leading experts in technology law and design.

Keywords: internet of things; ambient intelligence; ubicomp; technology futures; data protection and privacy law; privacy by design; human computer interaction



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3B. BUSINESS INSIGHTS

- **1) Differentiated resources**
 - SMEs
 - investment – not compliance
 - Lack of resources
 - Multinational
 - systematic, resources available; internal advice
- **2) Business models and motivations for engagement (IoT market).**
 - Cheap device - Monetise personal data - Stockpile data for later use
 - Protect Brand values... fear of hacks, scandals
 - Making a better product - fear of competitive disadvantage



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3C. REGULATORY INSIGHTS

- **Contextualising Privacy by Design and Legal Values**
 - Technologists: Uncertainty of term – contested values – need to contextualise PbD for different sectors eg smart cars, energy etc
- **Regulatory Challenges in practice**
 - Smart phones as mediating devices for consent
 - Complexity of IoT ecosystems eg smart building vs fitbit
- **Managing Risk and the Realities of Enforcement**
 - Commercial mindedness to enable growth
 - Difficulties assessing risk of enforcement/sanctions
 - Pace of tech change vs law playing catch-up
 - A29 WP advice v valuable

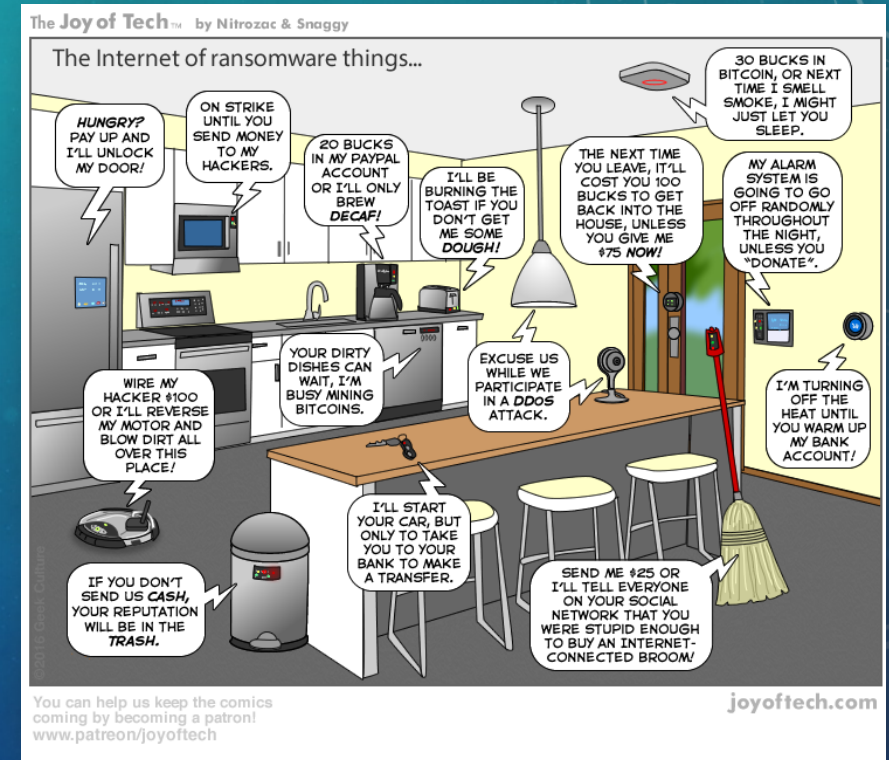


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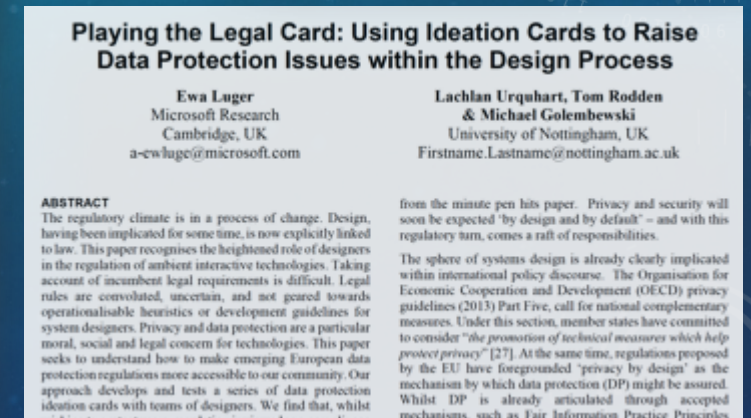
3D. TECHNOLOGICAL INSIGHTS

- **Application Led Framings of Technology**
 - Move away from need to define what is or isn't IoT – focus on applications, contexts of use...not visions
- **Appreciating Conflicting Agendas**
 - Technologists pulled many ways – business case, compliance, security, usability
- **Communicating the Relevance of Law to Designers**
 - Contextualise and translate law - internal codes of practice , standards, personal life/scenarios



4A. DESIGN PERSPECTIVES - PRIVACY BY DESIGN CARDS

- Raise awareness; Support engagement; Resource for reflection on legal concepts
- Ideation cards to surface and explore issues
- History of use value sensitive design, security, IDEO...
 - Structured approach to introduce new concepts into design process
 - Translation of Legalese
- Original Deck - ACM CHI 2015
- Expansion to whole GDPR
 - Project: U of Nottingham, Microsoft Research Cambridge, U of Edinburgh



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4b. Clusters



Legal Principles

- Informed, unambiguous consent
- Purpose limitation
- Data minimisation

Rights:

- To be forgotten
- Subject access
- To data portability

Responsibilities

- Data Security
- DP Impact assessment

Global Data Flows

- Adequate Protection
- Cloud Computing

Definitions

- Personal Data
- Data controller
- Data Processing

4C. TESTING THE CARDS

- 3 organisations:
 - Large media company (MOZ)
 - Innovation networking body for SME/Start-up (INC)
 - Small tech business trade association (SBA)
- 24 participants
 - Table opp.
- Findings: Regulatory Literacy

Job Cluster	Example Jobs	Percentage of Overall Participants
1. Business Strategy and Management	e.g. Managing Director; Facilitator; International Development; Auditor/Accountant; Marketing; Patent Attorney	33% (8)
2. Technology, Design and Creative	e.g. Software Engineer; IT Consultant; Programmer; Cyber Security and Privacy Consultant; Producer; Graphic Designer; UX Designer;	50% (12)
3. Research	e.g. Industry Research Scientist; Senior Lecturer; PhD Student	17% (4)

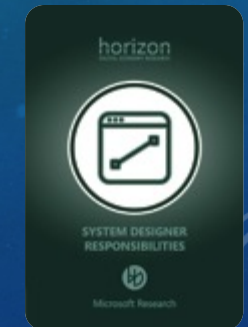
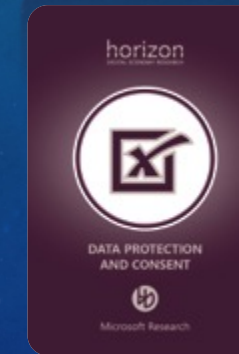
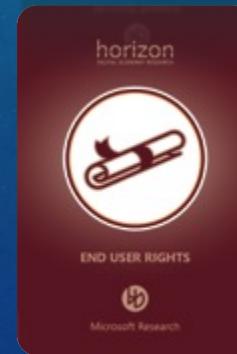
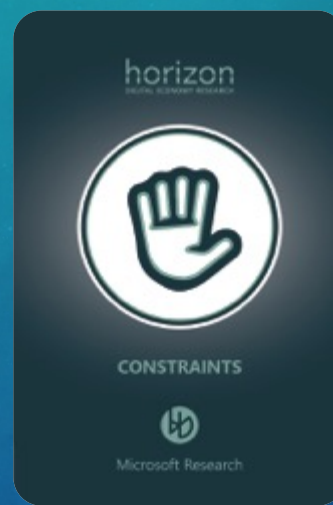
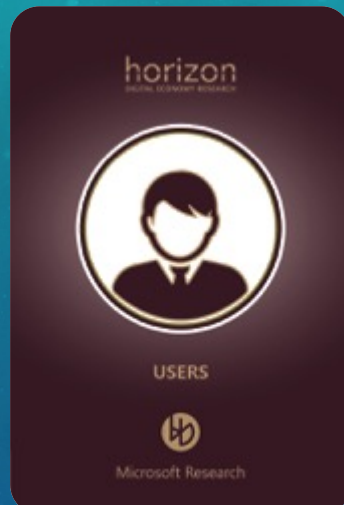
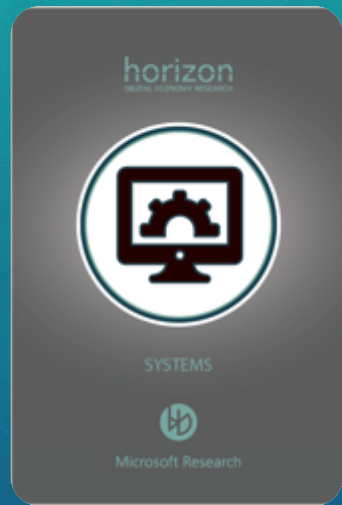
4D. THE DECK

1 System card

1 Users
card

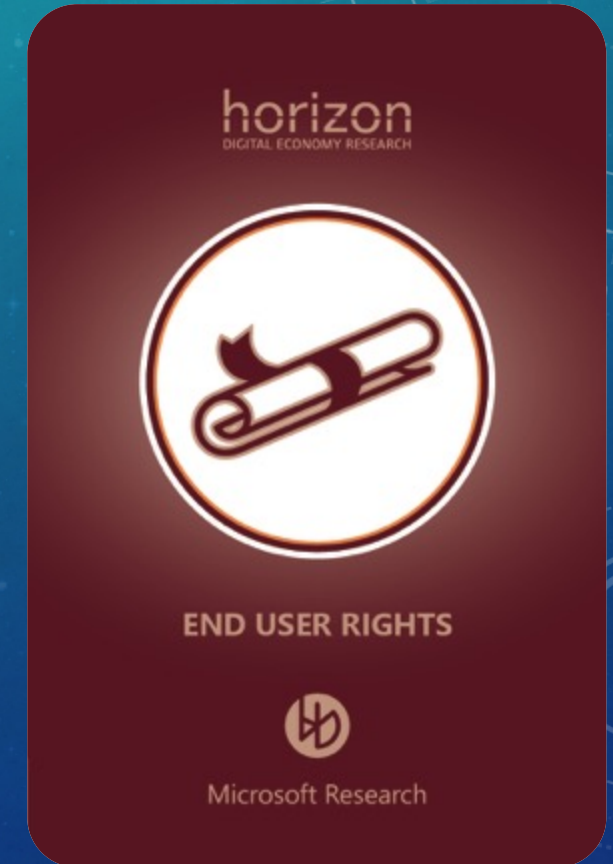
2 Constraints
cards

2 Legal Cards



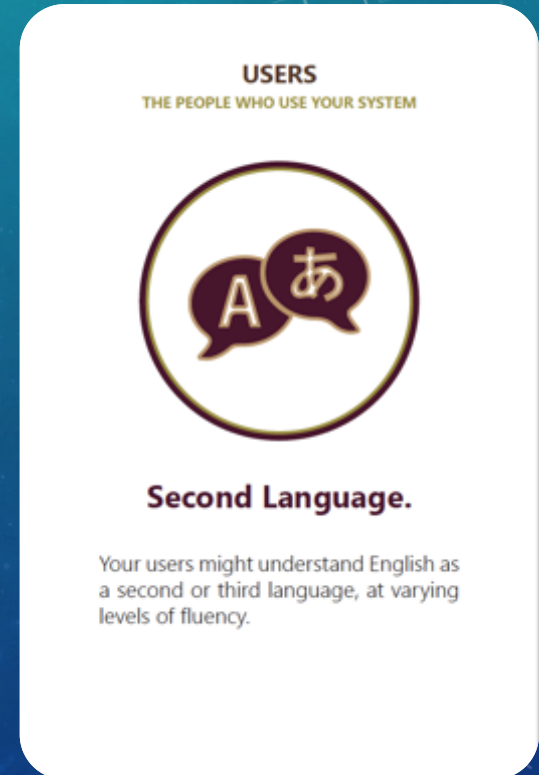
4E. REGULATORY INTERACTION

- Motivations: A Spectrum of Values and Responsibilities
 - Protection of reputation, guarding against bad publicity, litigation or loss of public trust.
 - Necessity - SMEs
- Negotiating with the Law
 - Rich discussion of law – not using legal terms
 - Legal authority mandates action
 - MOZ - cards empower employees – knowledge engaging with internal advice giving bodies
 - SBA – easier entry point to law



4F. SENSE-MAKING STRATEGIES

- Support Mechanisms with Networks, Community and Leadership
 - SMEs - self help – face to face social network
- Cards as Awareness Raising, but what next?
 - Concise, creative, fun, tool that prompts reflection
 - Desire from SMEs further resources – roadmap of further action



4G. MANAGING COMPLEXITY

- Designer Responses - Risk Management, Utility and Granularity of Data
 - Balance desire for more data, with legal compliance risks
 - Keen awareness of privacy – control granularity internal and external (occupants vs third parties)
 - Security big concern for SME
- Pragmatism and User Centricity
 - Difficulty reconciling commercial nature of consent and desire for consent to be better for users
 - Translation comprehension not just info
 - International Transfer - Local storage, avoid US cloud



QUESTIONS?

- Thanks for Listening
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