

Responsible IoT Design

Software Based Products (IO1075)

J.S. Love

Aspects of Responsible or 'Good' IoT Design

- Security
- Privacy
- IoT Future & Sustainability
- Trustworthiness & Transparency

+ many more

THE OPPORTUNITY FOR RESPONSIBLE BUSINESS: Ethics, Human Rights, and Technology in the Fourth Industrial Revolution



As technology transforms every facet of society, there is an increasing focus on societal impact. Today's consumers shop with their values, and look for companies with ethics at their core.

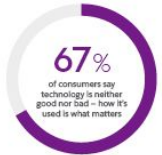
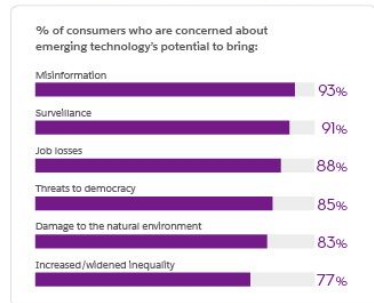
CONSUMERS SEE HUMAN RIGHTS AS A BUSINESS IMPERATIVE



GOOD ETHICS IS GOOD BUSINESS



TECHNOLOGY CAN HELP OR HARM SOCIETY



Security & Risk Management

Security landscape - What needs securing?

- Devices
- Service connections (esp. Local wireless)
- ...?

CIA principles

(Confidentiality, Integrity and Availability)

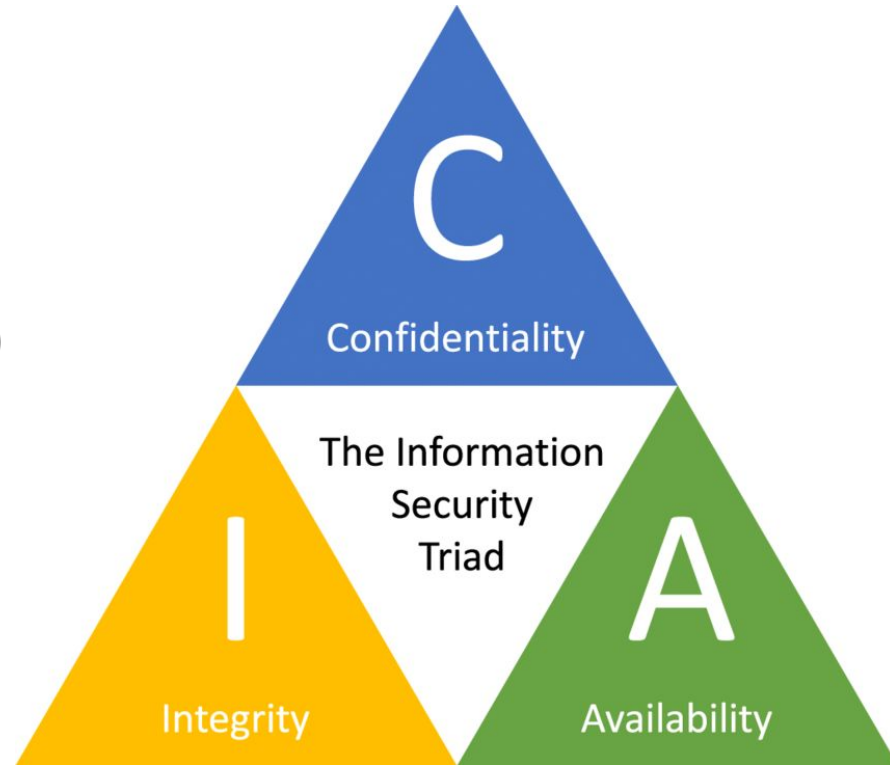


Image credit: Nikander et al. 2020 (CC-BY)

<http://dx.doi.org/10.1016/j.compag.2020.105776>

Security Measures

- Tamper-proof hardware
- Authentication - passwords and devices
- Encryption



Tamper-evident tags

Image sources:

<https://www.nfcw.com/2015/05/08/335142/rapidnfc-shows-off-tamper-proof-tags/>

<https://www.serpro.co.uk/sentrylock-custom-printed-tamper-proof-security-tags.html>

Designing IoT Security

- Use current measures to protect hardware and software
- Know what is in your system and assess risk
- Install 'good' settings by default
- Plan for updates and end-of-life

Good Practice Organizations

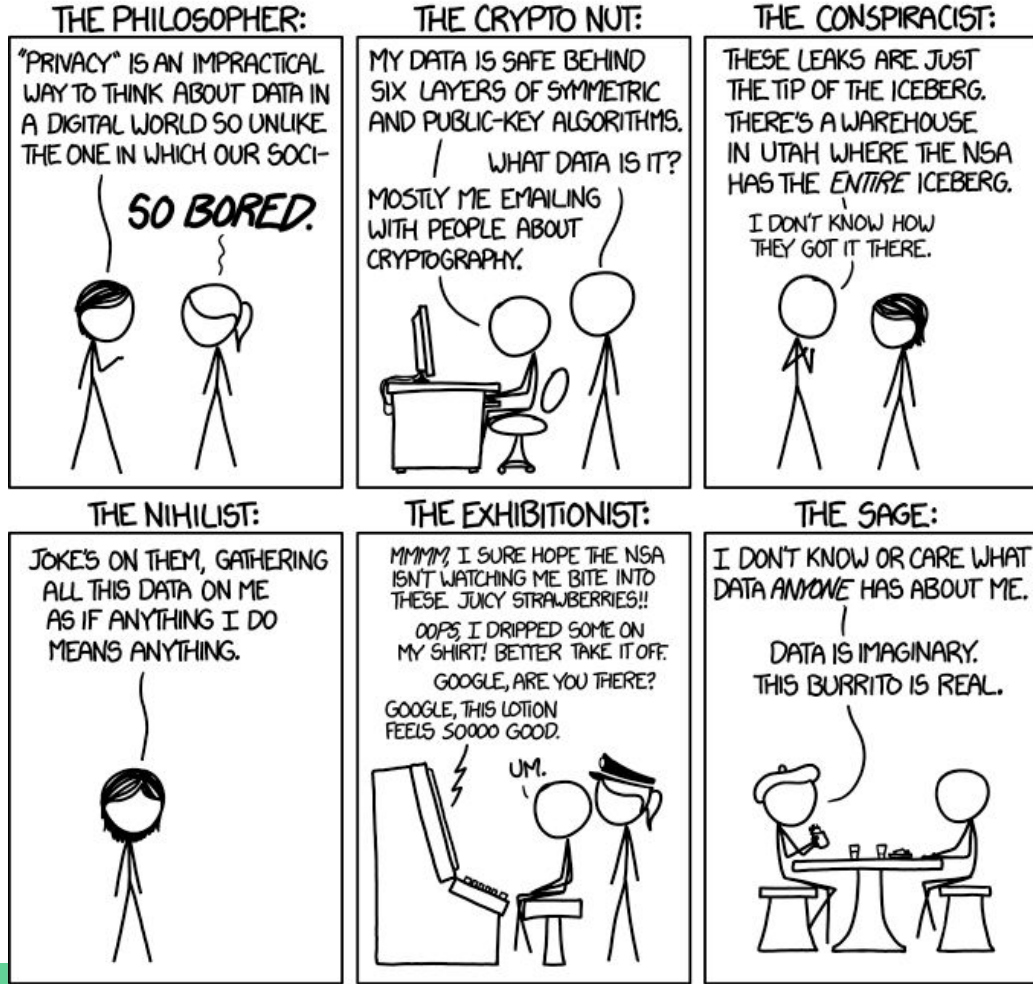
IEEE INTERNET
INITIATIVE



OPINIONS ON INTERNET PRIVACY

Privacy in IoT Design

- Value-based
- Can vary greatly between users and groups of users
- Situation-dependent



Privacy By Design

Seven Foundational Principles (after Cavoukian 2011)

- Proactive not Reactive; Preventative not Remedial
- Privacy as the Default Setting
- Privacy Embedded into Design
- Full Functionality – Positive-Sum, not Zero-Sum
- End-to-End Security – Full Lifecycle Protection
- Visibility and Transparency – Keep it Open
- Respect for User Privacy – Keep it User-Centric

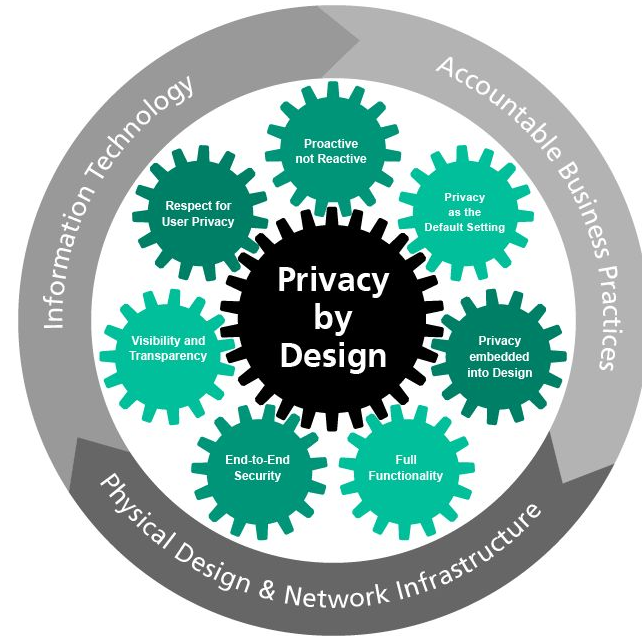


Image credit: Massimo Mangia

<https://digital-health.blog/2019/07/19/privacy-by-design-theoretical-principle-or-development-methodology/>



Withings
Thermo

Privacy

Amazon Ring Video Doorbell



23 Dec 2020 article from The Guardian on hacks of Ring cameras
<https://www.theguardian.com/technology/2020/dec/23/amazon-ring-camera-hack-lawsuit-threats>

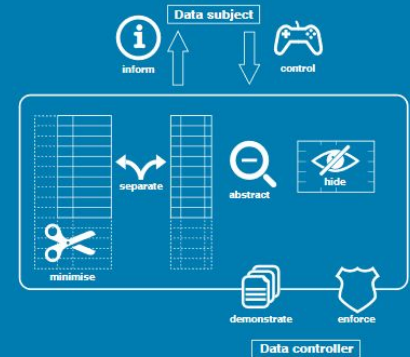
Ethical Explorer

Tools to help navigate
the future impact of
today's technology



Designing for Privacy

Privacy Design Strategies (The Little Blue Book)



Jaap-Henk Hoepman

Future of IoT Design - Sustainability



IoT energy monitoring and
selection
(<https://www.watttime.org/>)

IoT sensor network for sustainable
cocoa farming
(<https://www.libelium.com/libeliumworld/success-stories/sustainable-farming-and-the-iot-cocoa-research-station-in-indonesia/>)

Trustworthiness, Transparency & Co-creation



<https://trustabletech.org/>

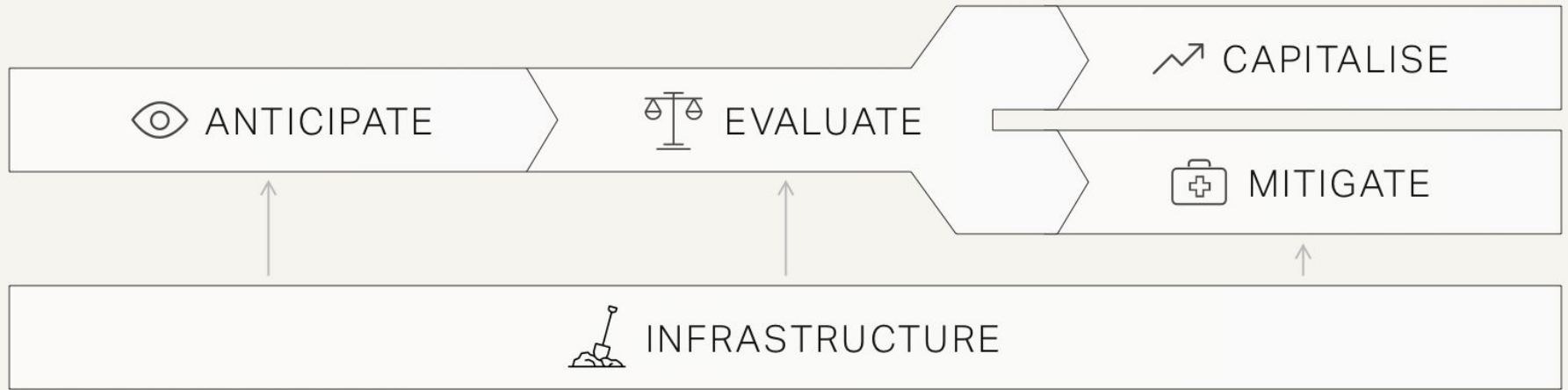


Better IoT -
<https://betteriot.wordpress.com/>



Building Wakanda (pan-African IoT platform)
<https://cchubnigeria.com/open-iot-community/>

Cennydd Bowles' Responsible Design model



Source: <https://cennydd.com/blog/responsible-design-a-process-attempt>

Assignment: 'Good' Design Analysis

Pick an IoT product we haven't worked with yet in the course - perhaps something you yourself own

[link to Miro board draft assignment:

https://miro.com/app/board/o9J_IRm3pks=/]