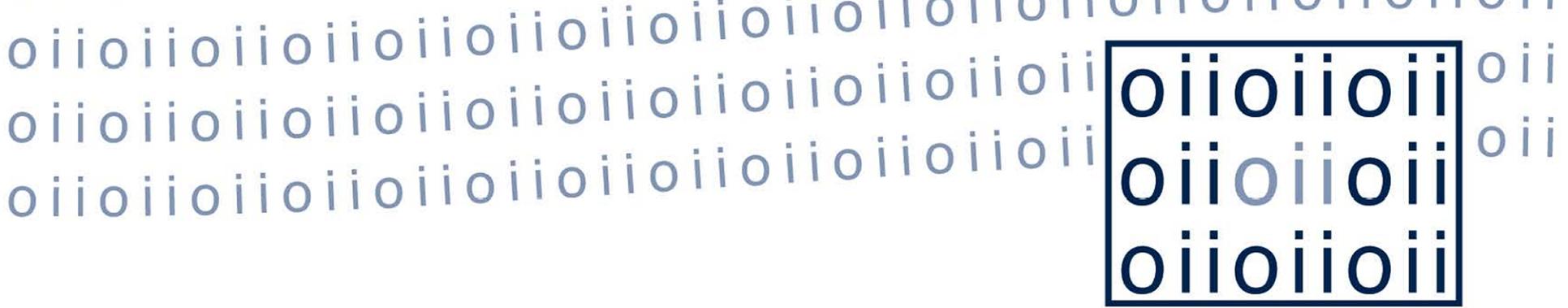




Ben Zevenbergen
Oxford Internet Institute,
University of Oxford



Ethics in Networked Systems Research

Aim:

- Practical guidelines for network engineers
- Through multidisciplinary reflexivity

Law



Universiteit Leiden



UNIVERSITEIT VAN AMSTERDAM

NEDERLANDSE ORDE VAN ADVOCATEN



Law

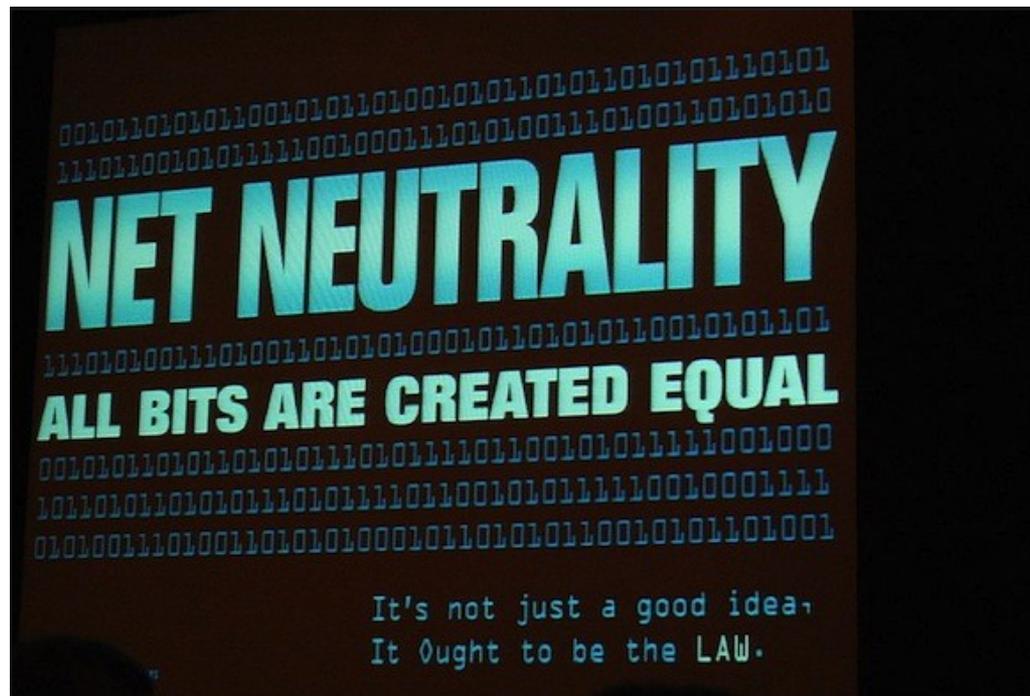


Politics

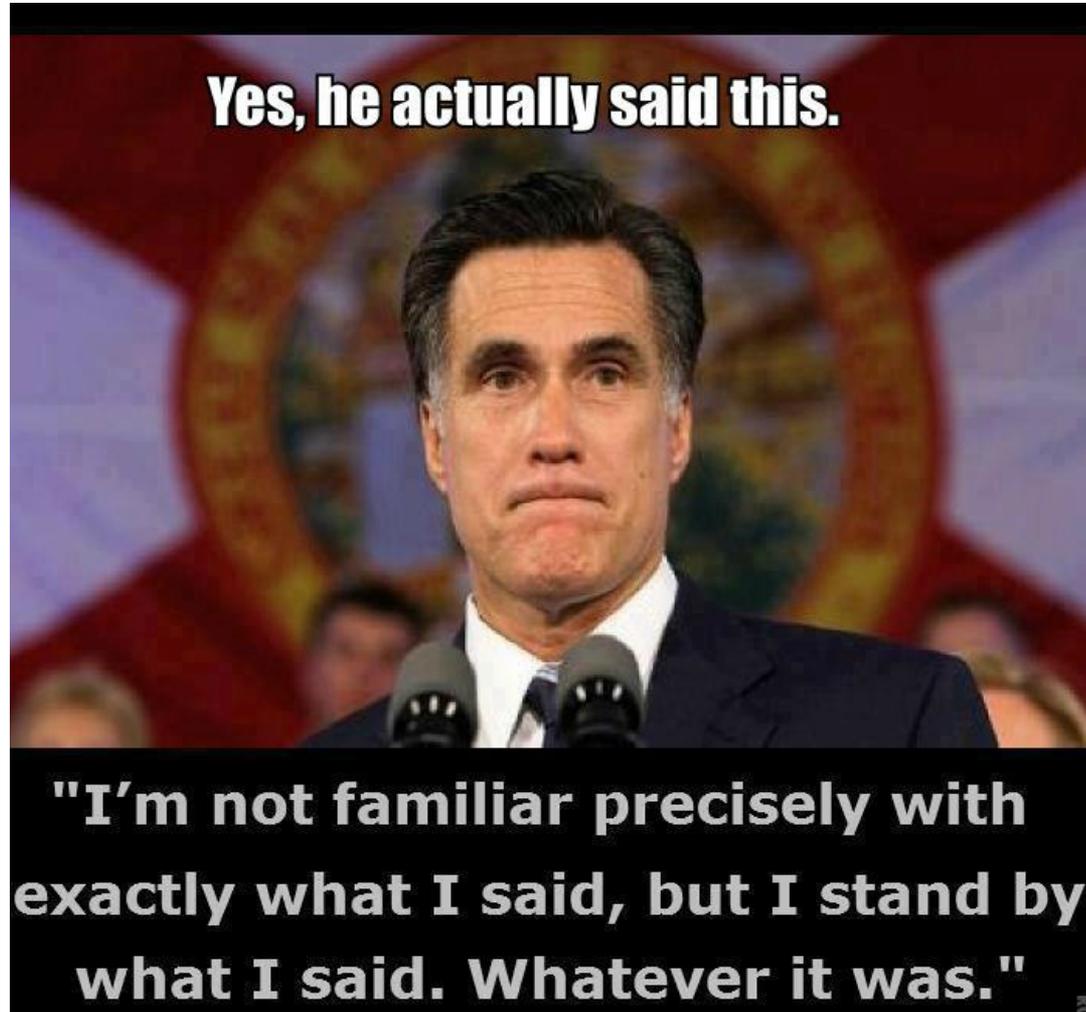
TECHNOLOGY

European Parliament Rejects Anti-Piracy Treaty

By ERIC PFANNER JULY 4, 2012



Politics



Academia





Reverse Reasoning

- Engineering:
 - *Consequentialist*
 - “The End justifies the Means”
- Philosophy, Law, Social Science, etc.:
 - *Deontology and Virtue Ethics*
 - Judges morality of the End and moral character of researcher based adherence to a rule or rules of the Means applied.

SAN DIEGO SUPERCOMPUTER CENTER

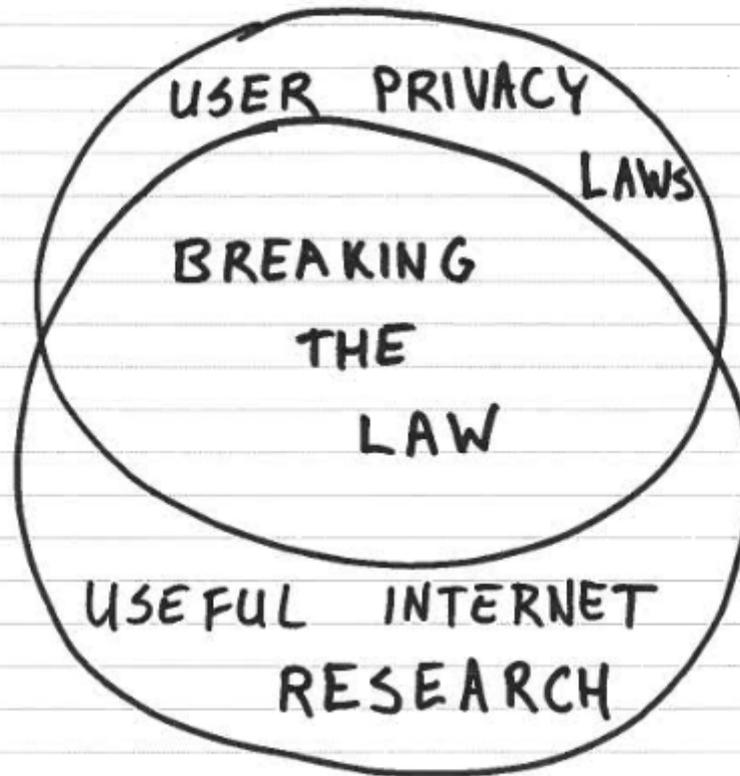
UNIVERSITY OF CALIFORNIA, SAN DIEGO

9500 Gilman Drive # 0505

La Jolla, CA 92093-0505

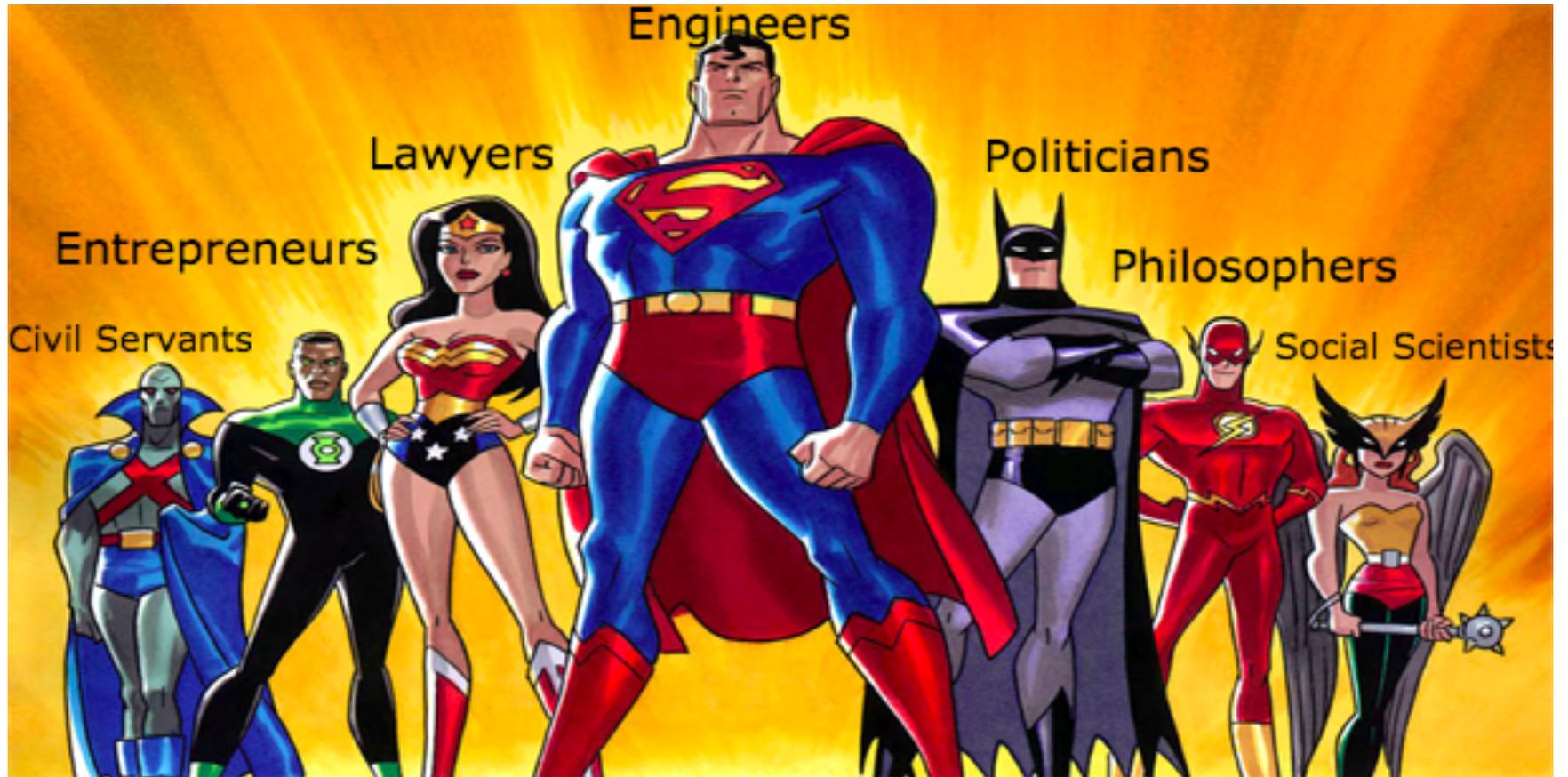
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SDSC

Who rules the ethics gap?



Project Workshops

- 50/50:
 - Engineers
 - Philosophers & lawyers
- Discussing cases with moral dilemmas
- Reflecting on reasoning
- Building disciplinary bridges

Watch me solve
the world's problems...

The Internet is a
sociotechnical system!



Tech neutrality?

- **Tech is not neutral nor value-free**
- Tech design reflects choices
- Tech designers in position of power
 - Moral responsibility
- Lack of communication across disciplines
- Need for (structured) normative reflexivity in design

Dual Use of Technology

- "Technique carries with it its own effects, quite apart from how it is used... **No matter how it is used, it has of itself a number of positive and negative consequences.**"

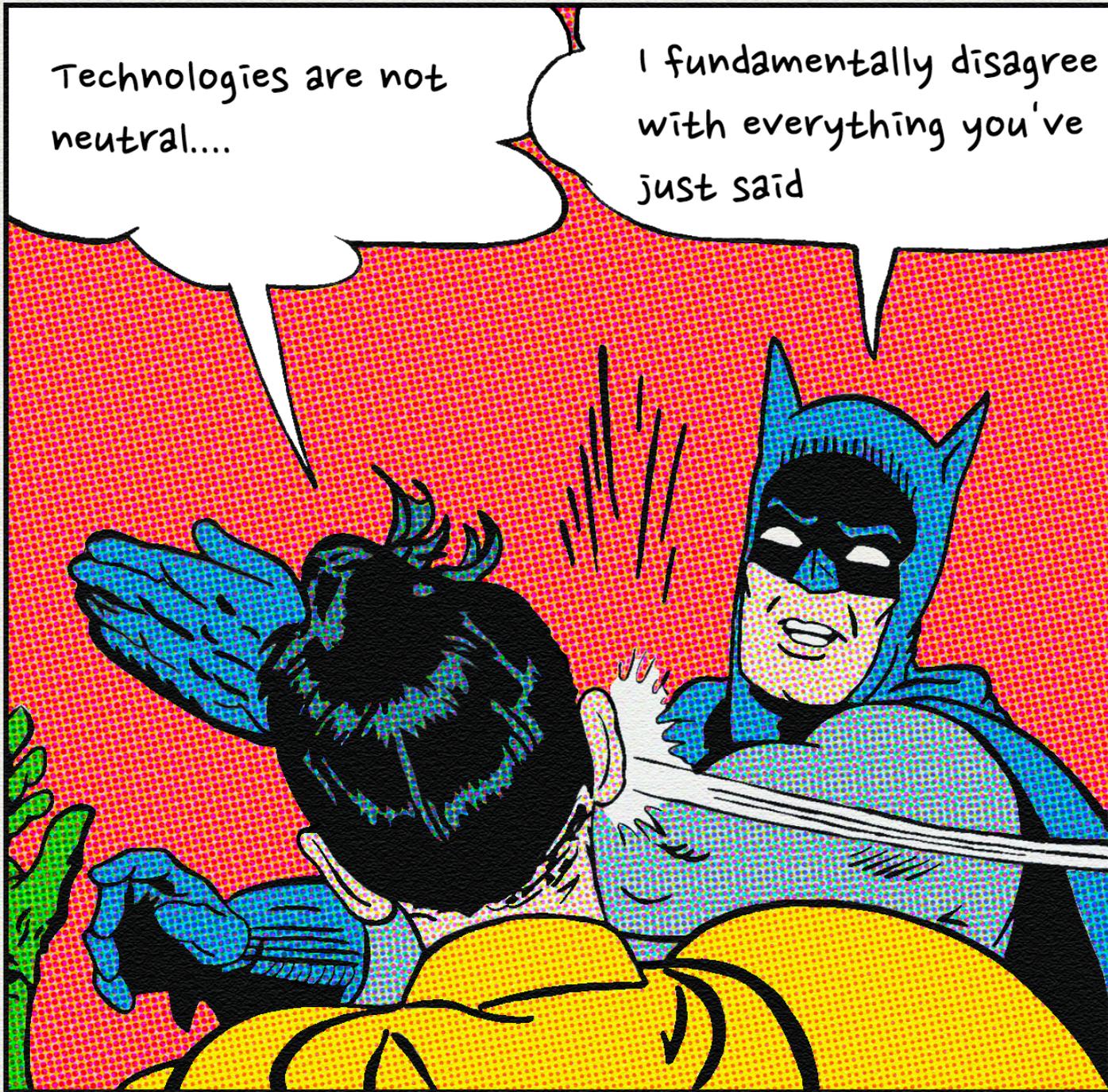
-Jacques Ellul

Sociotechnical

- "Tools are **not neutral** and their use may contribute to shaping our purposes"
 - Daniel Chandler
- "[...] what matters is not the technology itself but the **social and economic systems in which it is embedded**"
 - Langdon Winner

Technologies are not neutral....

I fundamentally disagree with everything you've just said



Blockchain technologies (1)

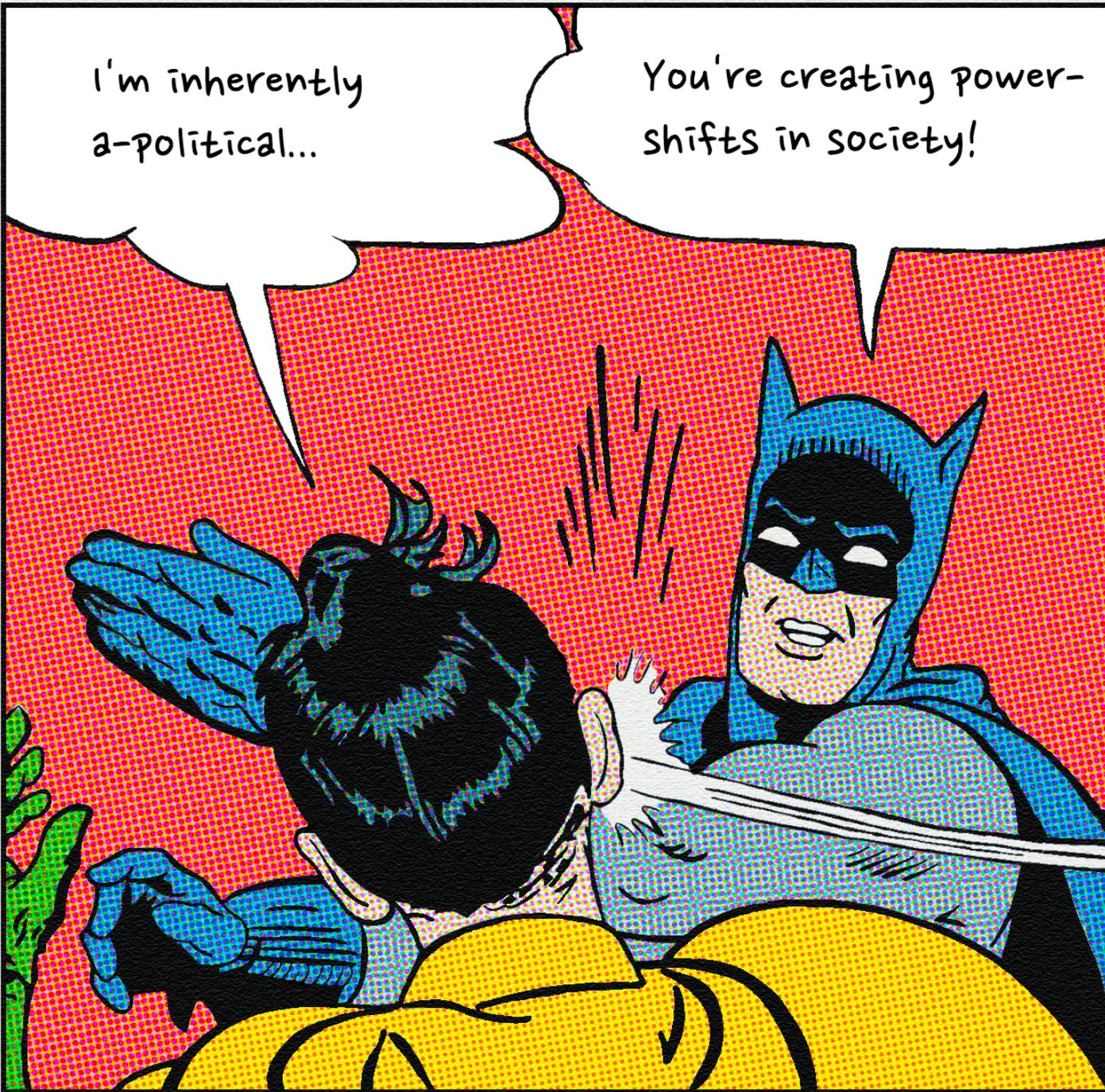
- Decentralisation (*can lead to scale free power laws, leads to inequality*)
- Disintermediation (*consumer rights?*)
- Transparency (*vs privacy, trade secrets, etc.?*)
- Trustless system (*For my savings I'd rather trust a legally accountable bank more than volatile cryptocurrencies*)
- Computationally mediated contexts (*Nice for libertarian engineers, possibly less so for the rest of society who feel uncomfortable*)
- Security (*great, but at which cost?*)
- Interoperability (*I support this strongly, but proprietary systems give some comfort to most people who don't want to adjust with their IT every day*)

Blockchain technologies (2)

- Self-organisation (*would these organisations have exclusively libertarian techno-anarchist embedded values through the use of blockchain technology?*)
 - Independent identity reputation systems (*will this lead to all persons being reduced to a number? What about second chances, turning a page, etc.*)
 - Loss of control (*can we trust the loss of control in the long run? How about managing externalities?*)
- These assumptions all cause **power shifts** in society.

I'm inherently
a-political...

You're creating power-
shifts in society!



A full-page image featuring Spider-Man in his iconic red and blue suit, seen from the back. He is standing on a dark, jagged, metallic ledge. The background is a cityscape in a state of total devastation, with thick grey smoke billowing from the ground and buildings. A prominent skyscraper in the center-right is completely destroyed, its skeletal remains and twisted metal reaching into the sky. The overall atmosphere is one of desolation and the aftermath of a catastrophic event.

*"With great power comes
great responsibility"*
~Voltaire

Reasons for Guidelines

- Purely engineering mindset is no longer sufficient for Internet technology
 - Due to the mediating role of the internet in society, culture, commerce, politics, etc.
- Unexpected consequences of technology design can be huge and complex
- Important to know what you don't know

→ Multidisciplinary reflexivity!



Three cases:

1. Exploiting vulnerabilities
2. Censorship measurement
3. Further use of hacked data

Exploiting vulnerabilities

Paper

Images

Download

Hilbert Browser

Service Probe Overview

rDNS Overview

Update: We are working on a vast and ground-breaking census, this time we hope to do it legally. Please help us make this happen by donating bitcoins to: 1tUCEnTyKzWrTBn1tgruSRkfahGUhxHcq

Internet Census 2012

Port scanning /0 using insecure embedded devices

Carna Botnet

Abstract While playing around with the Nmap Scripting Engine (NSE) we discovered an amazing number of open embedded devices on the Internet. Many of them are based on Linux and allow login to standard BusyBox with empty or default credentials. We used these devices to build a distributed port scanner to scan all IPv4 addresses. These scans include service probes for the most common ports, ICMP ping, reverse DNS and SYN scans. We analyzed some of the data to get an estimation of the IP address usage.

All data gathered during our research is released into the public domain for further study.



Technologist Reasoning

- “Created a huge map of the Internet through the illegal use of half a million devices.”



Best dataset to understand the topology of Internet network.



Design principle was “be nice and don’t break things”



“All data gathered during our research is released into the public domain for further study.”

Ethics Reasoning

 Do you know who the stakeholders are (ie. humans who own devices)? Whose data are you releasing? What does it mean in their context?

 Can you justify why you're breaking laws?

- Is this a precedent to set?
 - Standards stick for a very long time

 Good bugs can be exploited

- So this should not be encouraged

Ethics Reasoning 2

- Trade-off benefits and harms
 - First problem defining risk of harm
 - Then problem identifying risk of harm
- But: What are the ethical costs of not having this information?

Outcome (1)

- The dataset is widely hosted and used to influence policy debates.
- Investigators have re-designed their methods so that the Means are ethically just, too.
- But did this inspire Shodan's baby monitor scandal?

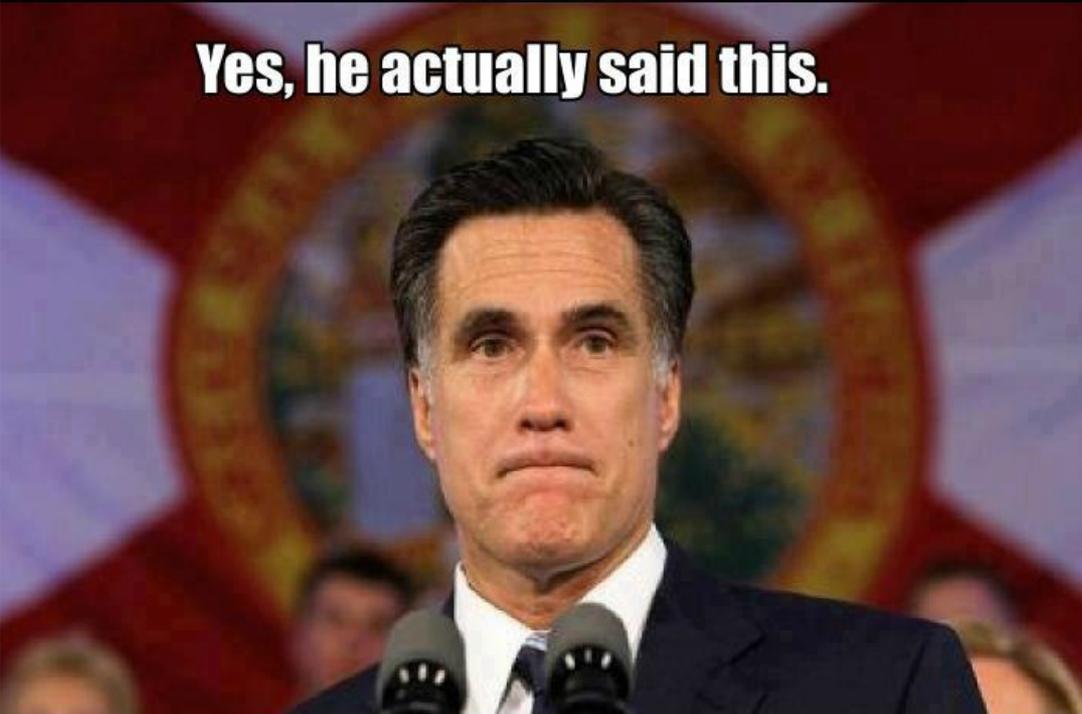
TECH & SCIENCE

ARE HACKERS SPYING ON YOUR BABY?

BY **ANTHONY CUTHBERTSON** ON 1/29/16 AT 4:56 PM



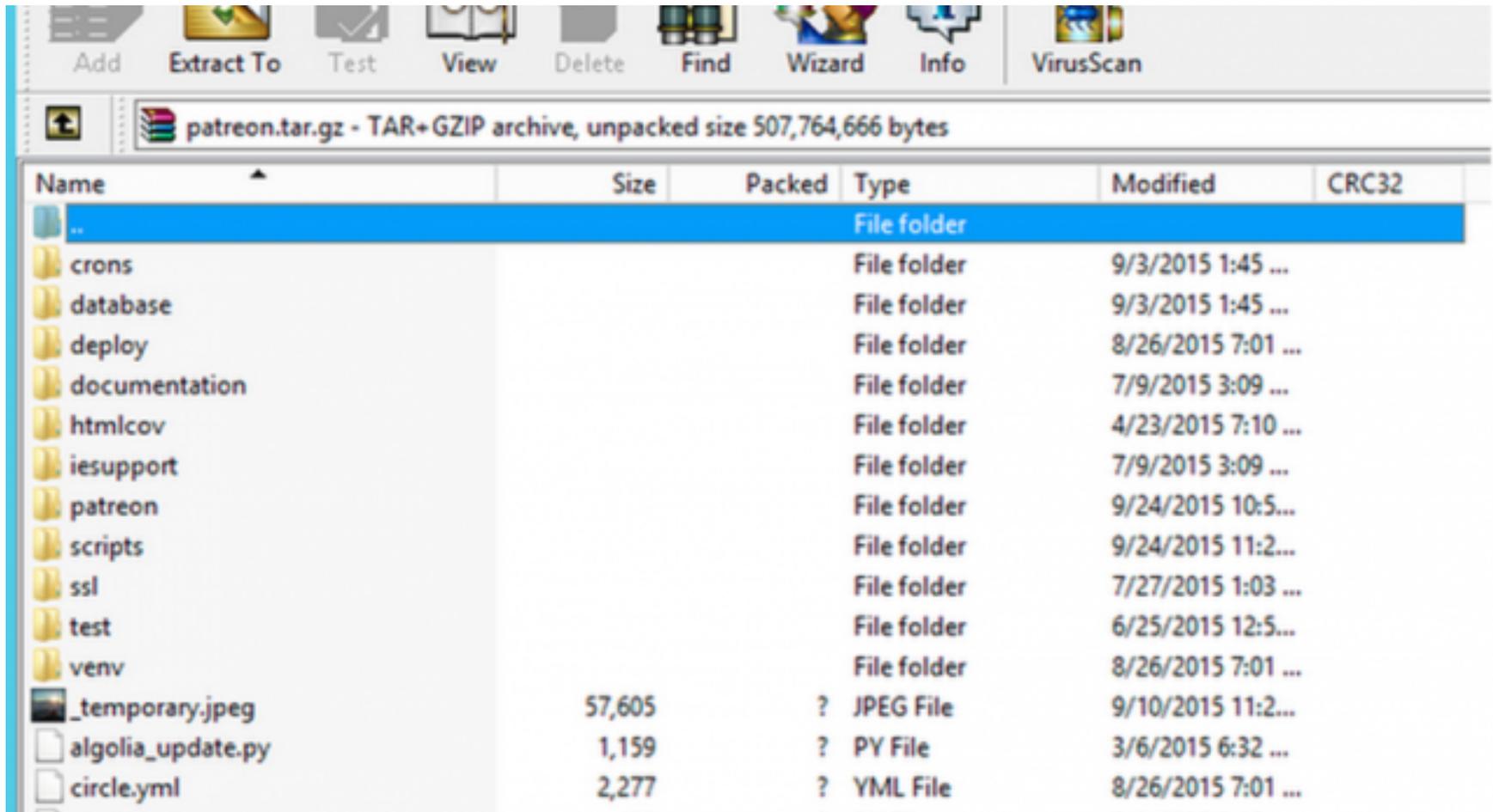
Yes, he actually said this.

A photograph of Mitt Romney speaking at a podium. He is wearing a dark suit, white shirt, and blue tie. He has a serious expression. The background is a blurred red and gold emblem.

"I'm not familiar precisely with exactly what I said, but I stand by what I said. Whatever it was."

RC

Using hacked data



Name	Size	Packed	Type	Modified	CRC32
..			File folder		
crons			File folder	9/3/2015 1:45 ...	
database			File folder	9/3/2015 1:45 ...	
deploy			File folder	8/26/2015 7:01 ...	
documentation			File folder	7/9/2015 3:09 ...	
htmlcov			File folder	4/23/2015 7:10 ...	
iesupport			File folder	7/9/2015 3:09 ...	
patreon			File folder	9/24/2015 10:5...	
scripts			File folder	9/24/2015 11:2...	
ssl			File folder	7/27/2015 1:03 ...	
test			File folder	6/25/2015 12:5...	
venv			File folder	8/26/2015 7:01 ...	
_temporary.jpeg	57,605	?	JPEG File	9/10/2015 11:2...	
algolia_update.py	1,159	?	PY File	3/6/2015 6:32 ...	
circle.yml	2,277	?	YML File	8/26/2015 7:01 ...	

Technologist Reasoning

- “... wanted to look at Patreon, but as far as I can tell they have no easy hook into all their projects (for scraping), so, to me this **data hack was like a gift!**”
- “... but given the entire site was hacked and exported I **don't see how currently anyone could have an expectation of privacy any more.** I'm not trying to torture the definition, it's just that **it was private until it wasn't.**”

Ethics Reasoning

- Processing any information that is linked to an identifiable person **without their consent** likely constitutes a breach of relevant privacy/data protection laws.
- **People had an expectation of privacy** at the time of communicating this data.
- Balancing test: Take into account the potential harm of using the information in this **new context and new audience** that you're creating for this information

Ethics Reasoning

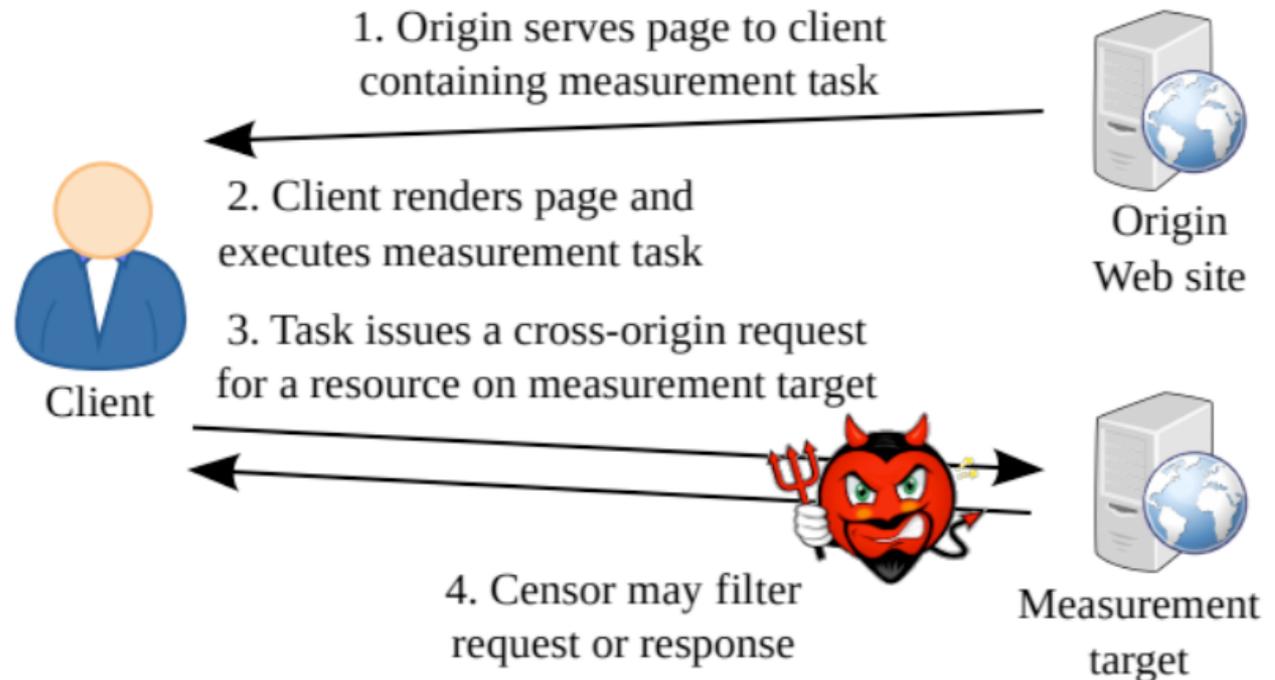
- It could be argued that by using this data, you're (implicitly) **condoning the act** of hacking and publishing this data.
- Entice others to also work with leaked data, therefore potentially **incentivising** (and even justifying) hackers for their acts (“for science!”).
- *Just because you can, doesn't mean you should.*

Outcome

- Case study being written up instead of using data.
- Lively discussion on mailinglists.
- **However, what if the data was from a petition website that hosted a campaign against the death penalty for homosexuality in Uganda?**

Censorship Measurement

```
<iframe src="//encore.noise.gatech.edu/task.html"  
width="0" height="0"  
style="display: none">  
</iframe>
```



Technologist Reasoning

- Existing URL lists.
- “It’s like any ad-tracker or social media button that are all over the Internet.”
- It’s not ‘human subject research.’
- No one has yet been harmed.
- “We will not know what governments think of this until someone ends up in jail.”
- “Informed consent would severely limit the scope of data that we’d collect.”

Ethics Reasoning (1)

- Lists include e.g. Falun Gong, pornography site
 - Illegal to access in some contexts
- Ad trackers don't request unlawful websites.
- How do you know no one has been harmed? What constitutes harm?

Freedom of speech
for all chinese!

People will end up in
jail because of your
vigilantism



Ethics Reasoning (2)

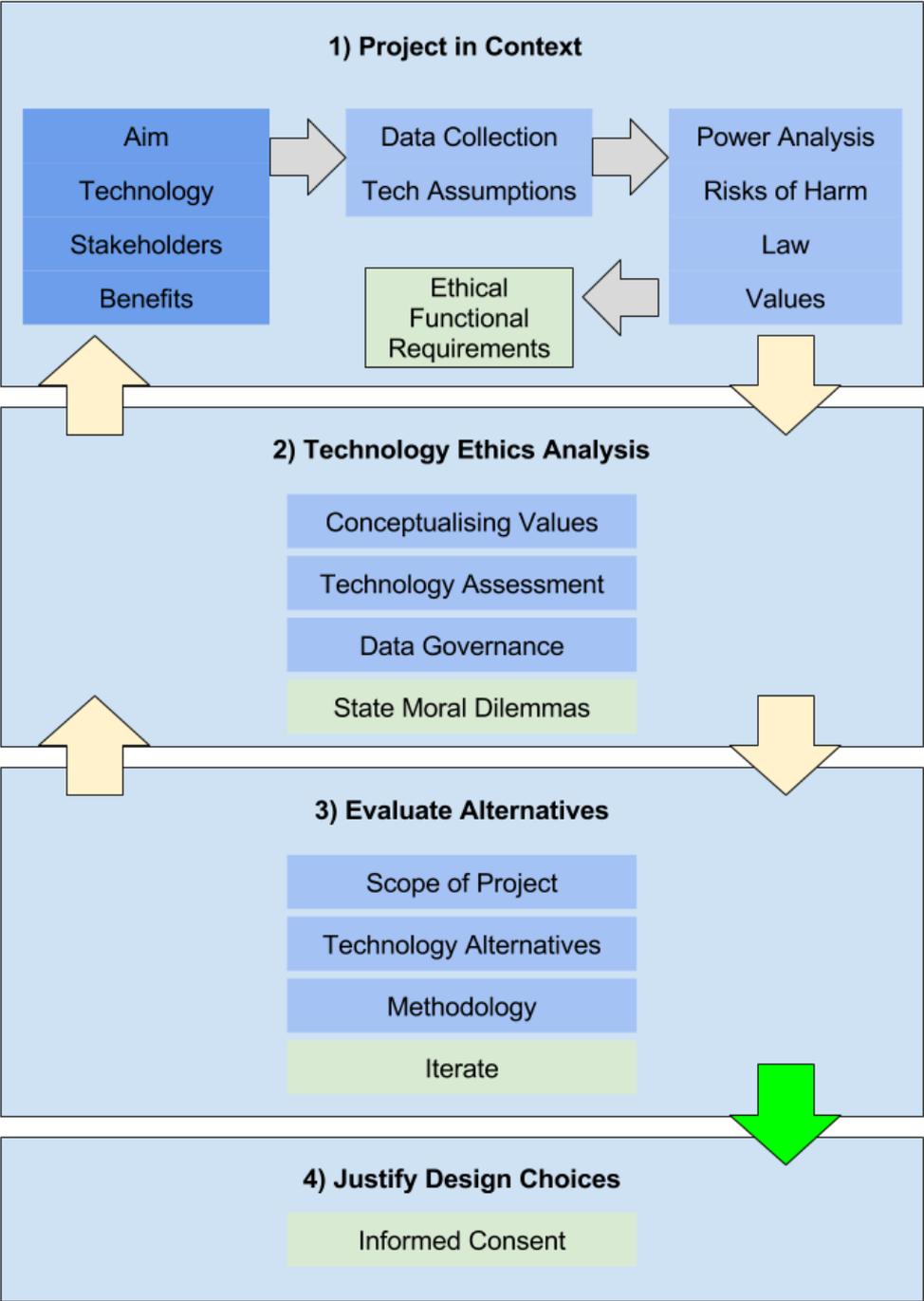
- Maybe not traditional human subject research, but potentially **human harming research**.
- Inherent knowledge & power imbalance
 - Relevant social norms often not understood by engineers.
 - Effect of technology and data collection poorly understood by data subjects.
- Analogies do not hold for Internet tech

Outcome

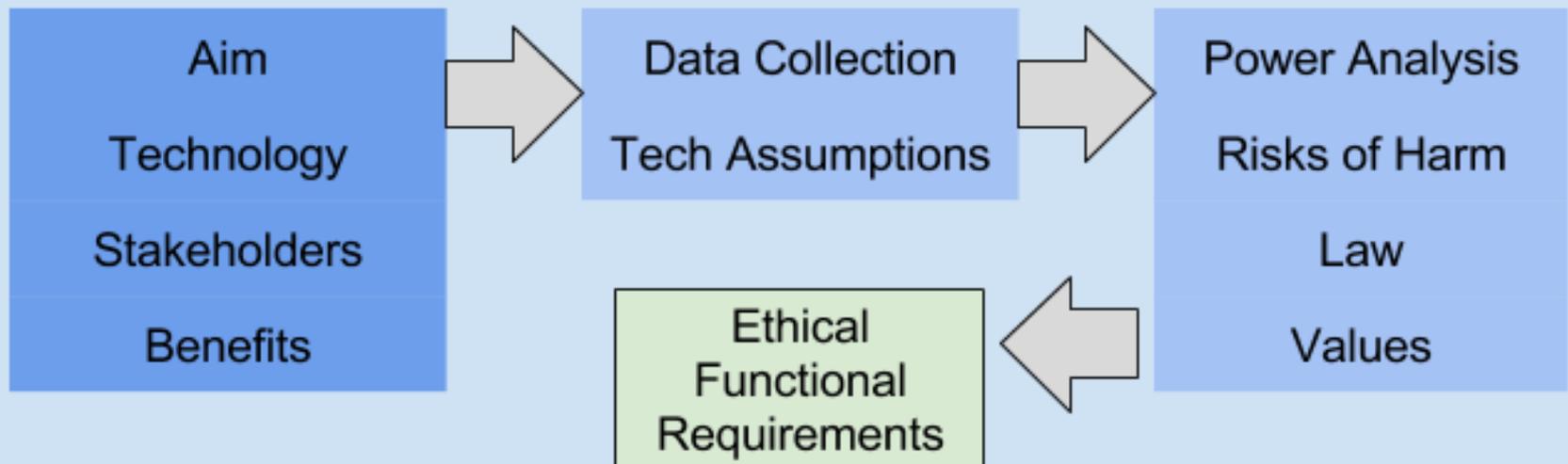
- Some academic papers have been rejected on ethics grounds
 - However, now accepted with a mandatory note, because the data is particularly good.
- Project scaled down considerably.
- Started this multidisciplinary debate.
- **Is the mechanism for Internet research ethics broken?**

Iterative reflexivity approach

- Based on
 - Technology and research ethics
 - Value sensitive design
 - Constructive technology assessment
- Stakeholders
 - Researcher, department, consortium
 - Ethics committee (uni, journal, conference)
 - Social scientists, lawyers, ethicists
 - Local peers, regional experts, etc.
 - Affected humans!



1) Project in Context



1) Project in Context

- In short, what is the main aim of the project?
- How will this research contribute to the state of the art in understanding Internet phenomena?
- Who are the actors and stakeholders involved directly or indirectly in this project?
- **Explain how the project (a) creates new information flows, (b) measures existing information controls, and/or (c) creates new databases, that previously did not exist in the context within which the project operates.**
- Will the collected data or inferred knowledge be directly relevant to and applicable in some specific government, business or academic processes?
- How can the knowledge generated support future research?
- **How will the research benefit society and specific stakeholders?**
- If the project is (partly) carried out in a different country, how do the different stakeholders in this country perceive the benefits of the project?

1.1 Power Analysis

- Following from the stated aim of the project, as well as the other answer given to section X, what are the sources of power of the identified actors and stakeholders?
- **How do the benefits identified in section X materialise for the identified actors and stakeholders as a direct or indirect result of the project?**
- Are the benefits and potential empowerment a result of the new information flows, the data generated, or the knowledge inferred?
- **Will the project magnify the existing powers that were already in place, or does the project create new powers in the context?**
- Are other actors and stakeholders disempowered in any way as a result of the project? If so, how?
- Will the project **upset or influence power relations** between actors and stakeholders in the context, or in other areas (such as national or international politics)?

1.2 Socio-political assessment

- Does the created database reveal anything that may be considered (politically) sensitive in the country of operation?
- **Will the new information flows measure or alter an existing politically sensitive control or management of information?**
- What is the conceivable political impact of the information that will be inferred from the new information flows and collected data? Will the behaviour or actions of particular actors or stakeholders be uncovered, and would this be considered to be politically sensitive in the country of experimentation?
- **If the new database or information flow is scrutinised by a powerful party in the country, what could conceivably be the impact on the rights and freedoms of individuals?**
- If plausible deniability would be an acceptable legal defence in the country of the researcher, to what extent can a participant or indirect subject in the experiment country realistically rely on this defence?

1.3 Law

- Which bodies of law are likely to be applicable to the technical operation of the project?
- Are fundamental rights of actors or stakeholders impacted?
- Will the project violate identified laws?
- **If the project will violate laws, can the project team justify this decision?**
- Have other project teams identified applicable laws in the given context? If so, has this had an impact on the technical operations of their project?

1.4 Values

- Which values are impacted by the project?
 - ownership and property,
 - privacy,
 - freedom from bias,
 - universal usability,
 - trust,
 - autonomy,
 - accountability,
 - courtesy, identity, and environmental sustainability.

2) Technology Ethics Analysis

Conceptualising Values

Technology Assessment

Data Governance

State Moral Dilemmas



Moral dilemma

*“A **trolley is running out of control** down a track. In its path are **five people** who have been tied to the track by a mad philosopher. Fortunately, **you could flip a switch**, which will lead the trolley down a different track to safety.*

*Unfortunately, there is **a single person tied** to that track.*

Should you flip the switch or do nothing?”

2.4 Assess moral dilemma

- How would the researcher solve the moral dilemmas using a **common sense** approach or their own **intuition**?
- What does the lens of **consequentialism** reveal about the right way to act?
- What does **deontology** reveal about the right way to act?
- Are any other ethical theories relevant to assess the right course of action?

3) Evaluate Alternatives

Scope of Project

Technology Alternatives

Methodology

Iterate



3) Evaluate alternatives

- Scope
 - Research question
 - Stakeholders
- Technology
 - Assess alternatives
- Methodology
 - Assess alternatives

4) Justify

- State residual dilemmas after iteration.
- Justify moral choices made.
- Develop informed consent sheet.
- Guidance for when informed consent is not possible/feasible.



