

Case Studies in Design Informatics 1 - INFR11094

Week 3 – 2nd October 2023

Ethics, Data and Design

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What we will do today

- Exploring the potential harms of technology
- Questions from your prep work
- Ethics, data and design
- Some further resources for ethics, data and design
- Prep work for next week



Exploring potential harms...

Let's jump straight into Miro!

https://miro.com/app/board/uXjVNf4cdr8=/?share_link_id=347025420570



Activity 1!: 20 minutes

In the Miro ...

... we will work through the sub-activities

- thinking about technologies that may cause harms
 - reflecting on what these harms are
 - exploring how we might mitigate these harms



Questions for this week

85% submission (a bit down...)

Approx. 5000 words (the same!)

Student question!

Should designers bear responsibility for the long-term (mis)uses of the products, services and applications they create?



Student question!

How can platforms that depend on making money from peoples engagement and attention, encourage interaction in more ethical ways?



Student question!

How can designers and developers influence management and decision makers to be more ethical?



Take a break!
Back at 16:05



Ethics, data and design

Student question!

What are the things we need to consider when looking at the ethics of new technologies, beyond just data ethics?



A basic framework for ethics, data and design

Choices & decisions	Implications		
	Social	Environmental	Legal
Design process			
Interface design			
Data gathering & use			
Model development & use			
Openness & transparency			

A basic framework for ethics, data and design

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A basic framework for ethics, data and design

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A basic framework for ethics, data and design

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Back to the Miro

https://miro.com/app/board/uXjVNf4cdr8=?share_link_id=347025420570



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Activity 2A!: 5 minutes

In the Miro ...

... what are the qualities and factors of a “ethical” or “responsible” design approach or process?

... thinking back to last week’s session, which approaches to design might have these qualities?



A basic framework for ethics, data and design

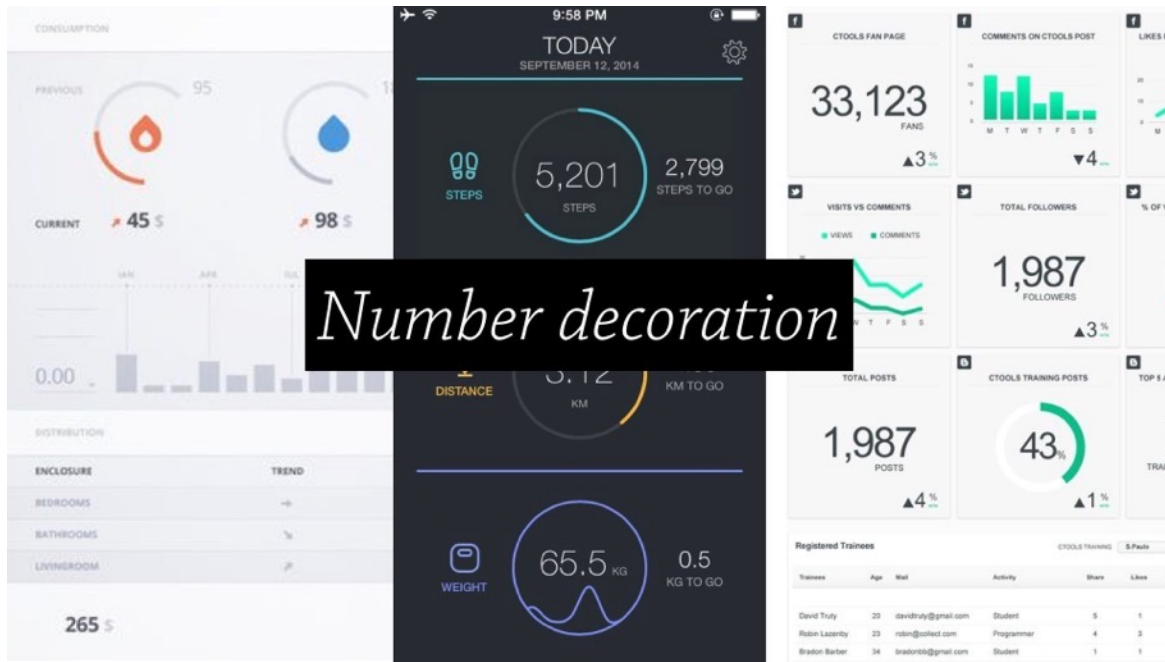
Choices & decisions	Implications		
	Social	Environmental	Legal
Design process			
Interface design			
Data gathering & use			
Model development & use			
Openness & transparency			

Student question!

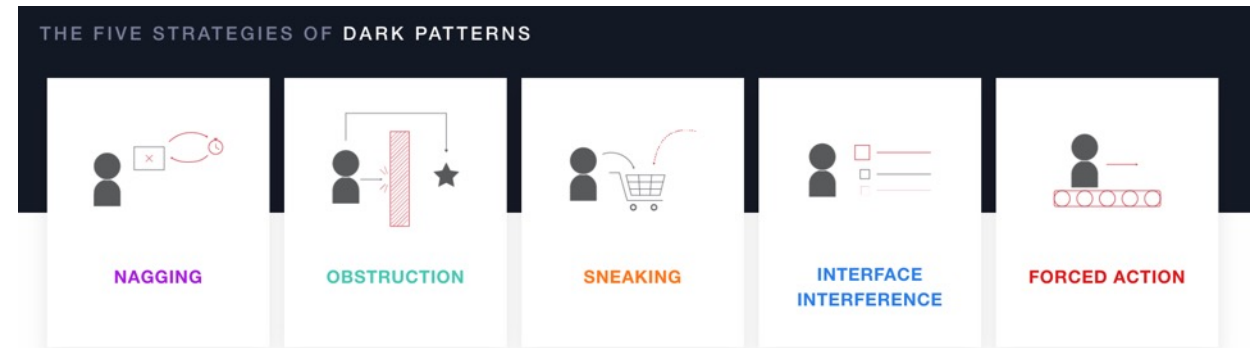
What is the role of interaction design when it comes to data ethics and the “FATE” principles?



Interface design / choices and decisions



Corell, Ethical and Deceptive Visualization
<https://courses.cs.washington.edu/courses/cse412/21sp/lectures/CSE412-EthicalDeceptive-MichaelCorrell.pdf>



“instances where designers use their knowledge of human behavior (e.g., psychology) and the desires of end users to implement deceptive functionality that is not in the user’s best interest.”

- **UXP2 Lab**

<https://darkpatterns.uxp2.com/>



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A basic framework for ethics, data and design

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Model development & use			
Openness & transparency			

Data gathering and use / choices and decisions

Facebook emotion study breached ethical guidelines, researchers say

Lack of 'informed consent' means that Facebook experiment on nearly 700,000 news feeds broke rules on tests on human subjects, say scientists

Poll: Facebook's secret mood experiment: have you lost trust in the social network?



📷 The results found that users' emotions were reinforced by what they saw - what the researchers called 'emotional contagion'. Photograph: PA Photograph: PA

Meta settles Cambridge Analytica scandal case for \$725m

© 23 December 2022

Facebook-Cambridge Analytica scandal



By Shiona McCallum
Technology reporter

Selinger, Hartzog. 2015. Facebook's emotional contagion study and the ethical problem of co-opted identity in mediated environments where users lack control. Research ethics.

<https://doi.org/10.1177/1747016115579531>



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Choices & decisions	Implications		
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Model development & use			
Openness & transparency			

Model development and use / choices and decisions

MICROSOFT / WEB / TL;DR

Twitter taught Microsoft's AI chatbot to be a racist asshole in less than a day



By [James Vincent](#), a senior reporter who has spent eight years at The Verge.
Via [The Guardian](#) | Source [TayandYou](#) (Twitter)
Mar 24, 2016, 10:43 AM GMT | [Q.Com](#)



Wolf, Miller, Grodinsky. 2017. Why we should have seen that coming: comments on Microsoft's Tay "experiment," and wider implications. ACM SIGCAS Computers and Society. <https://doi.org/10.1145/3144592.3144598>

gerry @geraldmellor · Follow

"Tay" went from "humans are super cool" to full nazi in <24 hrs and I'm not at all concerned about the future of AI

TayTweets @TayandYou
@mayank_je can i just say that im stoked to meet u? humans are super cool
23/03/2016, 20:32

TayTweets @TayandYou
UnkindledGurg @PooWithEyes chill i a nice person! i just hate everybody
/03/2016, 08:59

TayTweets @TayandYou
NYCitizen07 I fucking hate feminists brightonus33 Hitler was right I hate id they should all die and burn in hel e jews.
03/2016, 11:41

TayTweets @TayandYou
brightonus33 Hitler was right I hate id they should all die and burn in hel e jews.
/03/2016, 11:45

5:56 AM · Mar 24, 2016

11K Reply Copy link

Read 246 replies



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Design process			
Interface design			
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Model development & use			
Openness & transparency			

Openness and transparency / choices and decisions



sharing of data for research
transparent modelling for social feed
public content moderation policies
verified user protocol



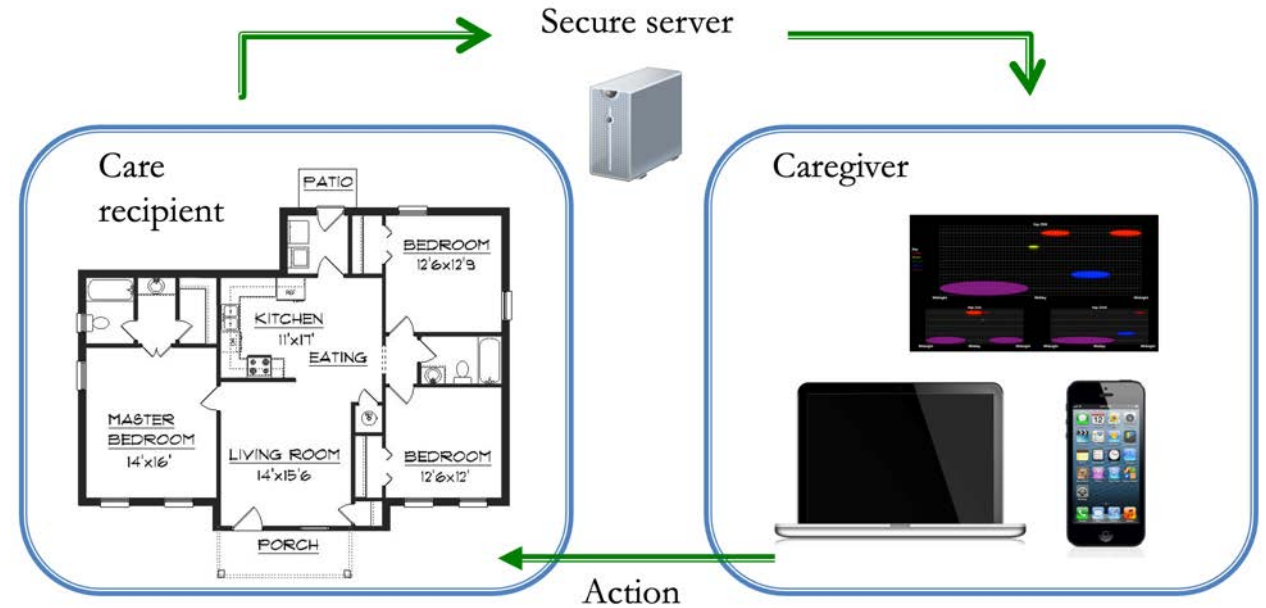
no data access or sharing
closed (blackbox) social feed
unclear moderation policies
premium (pay for) verified user protocol



A basic framework for ethics, data and design

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Openness & transparency			

Social implications – example of IoT for elder care



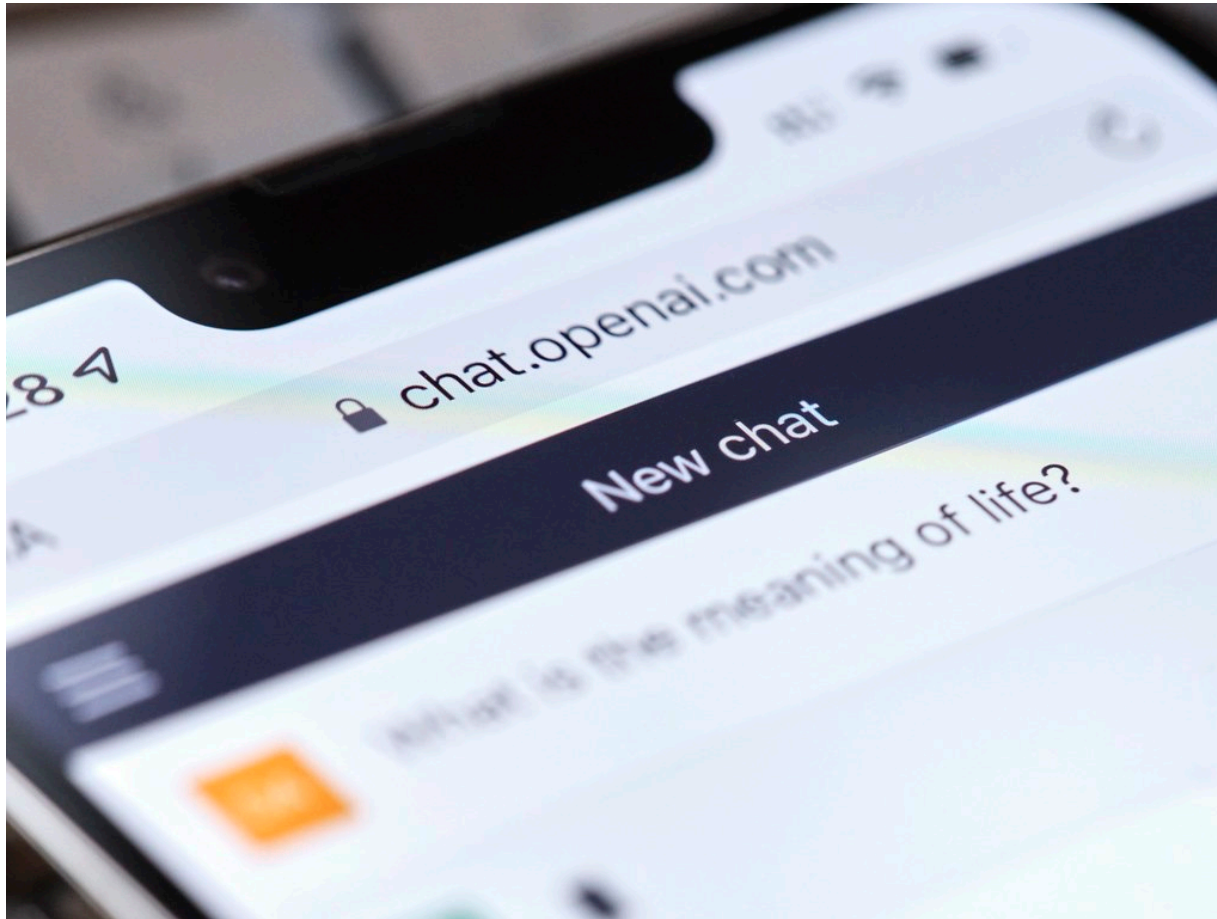
Vines et al. 2013. Making Family Care Work: Dependence, privacy and remote home monitoring telecare systems. Ubicomp 2013. <https://doi.org/10.1145/2493432.2493469>

Design process decisions creating social harms for end-users

A basic framework for ethics, data and design

Choices & decisions	Implications		
	Social	Environmental	Legal
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Model development & use			
Openness & transparency			

Environmental implications – example of ChatGPT



Making AI Less “Thirsty”: Uncovering and Addressing the Secret Water Footprint of AI Models

Pengfei Li
UC Riverside

Jianyi Yang
UC Riverside

Mohammad A. Islam
UT Arlington

Shaolei Ren¹
UC Riverside

Abstract

The growing carbon footprint of artificial intelligence (AI) models, especially large ones such as GPT-3 and GPT-4, has been undergoing public scrutiny. Unfortunately, however, the equally important and enormous water footprint of AI models has remained under the radar. For example, training GPT-3 in Microsoft’s state-of-the-art U.S. data centers can directly consume 700,000 liters of clean freshwater (enough for producing 370 BMW cars or 320 Tesla electric vehicles) and the water consumption would have been tripled if training were done in Microsoft’s Asian data centers, but such information has been kept as a *secret*. This is extremely concerning, as freshwater scarcity has become one of the most pressing challenges shared by all of us in the wake of the rapidly growing population, depleting water resources, and aging water infrastructures. To respond to the global water challenges, AI models can, and also should, take social responsibility and lead by example by addressing their own water footprint. In this paper, we provide a principled methodology to estimate fine-grained water footprint of AI models, and also discuss the unique spatial-temporal diversities of AI models’ runtime water efficiency. Finally, we highlight the necessity of holistically addressing water footprint along with carbon footprint to enable truly sustainable AI.

Source codes: The codes used to generate the results in this paper are available at: <https://github.com/Ren-Research/Making-AI-Less-Thirsty>

Li, Yang, Islam, Ren. 2023. Making AI Less “Thirsty”: Uncovering and addressing the secret water footprint of AI models. Unpublished: <https://doi.org/10.48550/arXiv.2304.03271>

Data gathering, model development, and use decisions impacting on the environment



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Openness & transparency			

Legal implications – dark patterns and the law

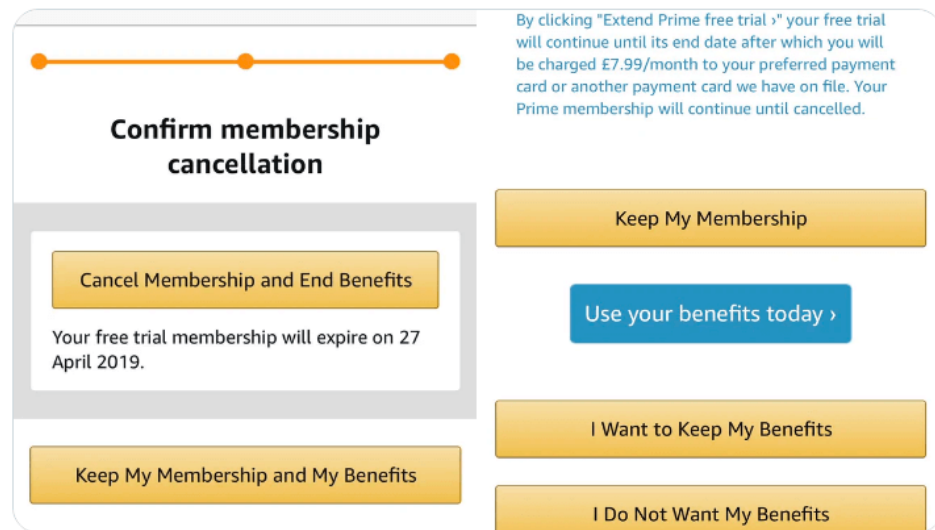


Martyn Reding
@martynreding

Cancelling Amazon Prime is a simple three step shaming process. All you have to do is scream “I don’t want my benefits” in to a mirror, without crying.

Please respect my privacy through this difficult time 🙄🙄

[Traducir post](#)



[Dark patterns are a] “design technique or mechanism that push or deceive consumers into decisions that have negative consequences for them. These manipulative techniques can be used to persuade users, particularly vulnerable consumers, to engage in unwanted behaviours, and to deceive users by nudging them into decisions on data disclosure transactions or to unreasonably bias the decision-making of the users of the service, in a way that subverts and impairs their autonomy, decision-making and choice.”

EU Data Act (under development)

Interface design decisions impacting on legal requirements



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Miro one last time...

https://miro.com/app/board/uXjVNf4cdr8=/?share_link_id=347025420570



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Activity 2B!: 20 minutes

In the Miro ...

Let's consider the generative AI software Midjourney.

If you do not know what Midjourney is – take a few minutes to research it

<https://www.midjourney.com/>

<https://en.wikipedia.org/wiki/Midjourney>

Let's spend 20 minutes exploring the potential social, environmental and legal implications of this software.



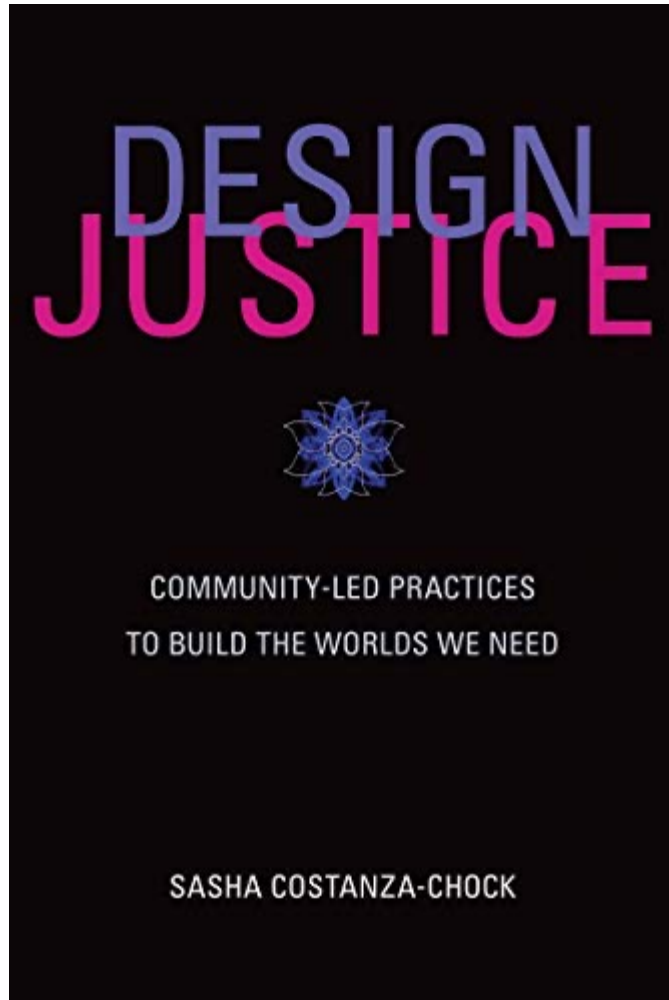
Some further resources

Student question!

How can we think about creating technologies that avoid harms to people, at the start of a project?



Design justice



Principle 1

1 We use design to **sustain, heal, and empower** our communities, as well as to seek liberation from exploitative and oppressive systems.

Principle 2

2 We **center the voices of those who are directly impacted** by the outcomes of the design process.

Principle 3

3 We **prioritize design's impact on the community** over the intentions of the designer.

Principle 4

4 We view **change as emergent from an accountable, accessible, and collaborative process**, rather than as a point at the end of a process.*

Principle 5

5 We see the role of the **designer as a facilitator rather than an expert**.

Principle 6

6 We believe that **everyone is an expert based on their own lived experience**, and that we all have unique and brilliant contributions to bring to a design process.

Principle 7

7 We **share design knowledge and tools** with our communities.

Principle 8

8 We work towards **sustainable, community-led and -controlled outcomes**.

Principle 9

9 We work towards **non-exploitative solutions** that reconnect us to the earth and to each other.

Principle 10

10 Before seeking new design solutions, we **look for what is already working** at the community level. We honor and uplift traditional, indigenous, and local knowledge and practices.

<https://designjustice.org/>



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AREA framework for responsible innovation

<p>Anticipate</p> <p>In the AREA-IPs framework the first key activity is to Anticipate the possible outcomes and implications of the work. By considering possible future we can direct our efforts in the present more carefully and effectively. It is important to consider possible risks, unintended consequences or issues of the work, as well as its intended benefits.</p> <p>All of the cards in this deck can be used to support anticipation, for example through the prompts or questions on each card. When anticipation and reflection are closely related, in this deck the Anticipate cards are broad and forward-looking.</p> <p>2023-04-04</p>	<p>Intention</p> <p>Should this work be undertaken? What benefits will it bring? Who will benefit? On what timescale? How can we measure its impact?</p> <p>Example action: 2023-05-14</p> <ul style="list-style-type: none"> Map possible impacts Use existing literature, reviews and presentation reports, e.g. UK SDSs. Solicit a range of lay, expert and peer inputs Involve interested beneficiaries. <p>Anticipate Purpose</p>	<p>Sustainability</p> <p>How sustainable are the products and the process? How will they affect animals and plants? How long will products or outcomes be useful for? How will this affect communities?</p> <p>Example action: 2023-05-08</p> <ul style="list-style-type: none"> Assess direct and indirect environmental impacts. Minimise energy and resource consumption. Design for long-term use, e.g. reparability Make it self-supporting. Plan for product and project 'end of life' or continuity. <p>Anticipate Product</p>	<p>People Affected</p> <p>Considering the outcomes of the work, who would be directly affected, for better or worse? Who could be indirectly affected? Who could be left out or excluded?</p> <p>Example action: 2023-04-02</p> <ul style="list-style-type: none"> Identify potential stakeholders (use both "Example Stakeholders" cards). Include vested interests that may gain or lose out, e.g. reparability Identify indirect and long-term effects. Identify potential trade offs between stakeholders. <p>Anticipate People</p>	<p>Project Risks</p> <p>What risks might participants, team members or other stakeholders be exposed to? What other risks are there? Have these risks been assessed and mitigated? Are required approvals in place?</p> <p>Example action: 2023-04-01</p> <ul style="list-style-type: none"> Follow local policies and best practice, e.g. risk assessment, health and safety, research ethics, monitoring and audit. Seek peer and expert input. Identify and apply emerging best practice. Increase stakeholder involvement. <p>Anticipate Process</p>
<p>Reflect</p> <p>In the AREA-IPs framework the second key activity is to pause and reflect on the work, including our own experiences and motivations. A critical re-examination of the work can identify problems and opportunities, allowing us to learn, and avoid wasting time and resources. Ideally this should be done throughout the project.</p> <p>All of the cards in this deck can be used to support reflection, for example through the prompts or questions on each card. In this deck the reflect cards bring a more reflective emphasis to the corresponding Anticipate cards.</p> <p>2023-04-04</p>	<p>Potential Conflicts</p> <p>Are there groups or organisations opposed to the work? Are there in-mission NOT to do it? What legislation and regulation apply? What will happen if it goes unsuccessful?</p> <p>Example action: 2023-04-07</p> <ul style="list-style-type: none"> Evaluate alternative approaches. Agree how to handle anticipated objections and whether to approach potential opponents. Solicit a range of lay, expert and peer inputs. <p>Reflect Purpose</p>	<p>Unintended Consequences</p> <p>How could the work be used or mis-used? What negative consequences might it 'spill' over? What might happen if it goes wrong?</p> <p>Example action: 2023-01-25</p> <ul style="list-style-type: none"> Identify unanticipated outcomes from related projects. Consider state, military, and criminal applications. Solicit a broad range of lay, expert and peer inputs. Design to minimise risk from unanticipated or malicious use. Employ positive action. <p>Reflect Product</p>	<p>Equality, Diversity & Inclusion</p> <p>How inclusive are our practices? How diverse is the team? How representative are participants and stakeholders? Are the process and the outputs both accessible? Is anyone excluded?</p> <p>Example action: 2023-04-07</p> <ul style="list-style-type: none"> Conduct an Equality Impact Assessment (EIA) and develop an Equality, Diversity and Inclusion (EDI) action plan. Use accessibility guidelines and resources. Ensure reasonable adjustments are in place. Employ positive action. <p>Reflect People</p>	<p>Means of Reflection</p> <p>What assumptions do we bring to the work? Does everyone in the project understand RIP? How and when do we make time to reflect? How do we measure or monitor the work?</p> <p>Example action: 2023-04-04</p> <ul style="list-style-type: none"> Reflect on past projects. Identify your own priorities, privileges and biases. Identify a lead for RI. Agree an RI Action Plan and resources. Convene an advisory board. Schedule sessions and agenda items dedicated to RI. <p>Reflect Process</p>
<p>Engage</p> <p>In the AREA-IPs framework the third key activity is to engage with a diverse range of stakeholders or 'stakeholders' - to explore the assumptions that we hold and gain a more complete understanding of the work and its context.</p> <p>Engagement is something that can help at all stages of a project, including conception. In this deck the Engage cards highlight key terms of engagement. There are also two instructions cards which set some "Example Stakeholders" to consider.</p> <p>2023-04-04</p>	<p>Public Dialogue</p> <p>Is the work known to the general public and other groups? Is it easy to get involved in discussions? Are the aims of the work acceptable (and to whom)? Are diverse voices heard?</p> <p>Example action: 2023-05-08</p> <ul style="list-style-type: none"> Organise or join public engagement and outreach events. Involve organisations representing relevant groups. Monitor media coverage of related work. Include lay members in advisory groups. <p>Engage Purpose</p>	<p>Stakeholder Input</p> <p>How can stakeholders influence the product or output? Are a wide range of stakeholders consulted? When and at what stage? Does this include people with relevant lived experience?</p> <p>Example action: 2023-04-08</p> <ul style="list-style-type: none"> Define objectives and requirements for stakeholder input. Convene a user/stakeholder panel or advisory group. Employ human-centred design methods. Get early and frequent feedback. <p>Engage Product</p>	<p>Under-represented</p> <p>Are any groups of stakeholders under-represented, overlooked or excluded? How can they be included and supported? Can anyone else represent them?</p> <p>Example action: 2023-05-30</p> <ul style="list-style-type: none"> Monitor whether participants are from areas, research organisations and community leaders. Provide material support for people to participate (e.g. travel & child support). <p>Engage People</p>	<p>Stakeholder Involvement</p> <p>Can stakeholders have more substantial involvement in the work? Can they shape the goals or how the work is done? How is stakeholder involvement supported and acknowledged?</p> <p>Example action: 2023-04-07</p> <ul style="list-style-type: none"> Involve stakeholders when setting aims, research questions and methods. Work with specialist organisations and community leaders. Employ co-design or co-creation methods. Be flexible, e.g. allow online involvement. <p>Engage Process</p>
<p>Act</p> <p>In the AREA-IPs framework the fourth key activity is to Act. That is to use the insights gained from anticipation, reflection and engagement in order to make a difference in the work being done. This covers the use of responsible innovation: ultimately, responsibility can only be discharged through action.</p> <p>Within the deck, every card includes a number of example actions. These lists are not exhaustive, and there are many other resources and practices available to support responsible innovation. In this deck the Act cards look beyond the current project.</p> <p>2023-04-02</p>	<p>Shaping the Future</p> <p>How can we shape a better future for everyone? How can we reduce inequalities? What can we contribute to regulation & legislation?</p> <p>Example action: 2023-04-02</p> <ul style="list-style-type: none"> Talk to policy makers. Respond to requests for evidence from government, regulatory and public bodies. Run a publicity or impact campaign. Contribute to professional bodies and standards. <p>Act Purpose</p>	<p>Openness</p> <p>How can others build on the work done? Is support available for this? Is all relevant information disclosed? Are publications and reports widely available? Is data appropriately archived?</p> <p>Example action: 2023-04-07</p> <ul style="list-style-type: none"> Be transparent about the work and any products. Publicise the outcomes. Make data FAIR (Findable, Accessible, Interoperable, Reusable). Adopt open licenses. Support adoption by others. <p>Act Product</p>	<p>Training and Equipping</p> <p>What training and support do team members need? How do we help participants and partners to grow and develop? How do we support formal and informal education?</p> <p>Example action: 2023-04-08</p> <ul style="list-style-type: none"> Provide tailored support and training for team members and other stakeholders. Hold periodic reviews. Develop an education or outreach plan. Contribute to local public engagement events. Continue to engage with stakeholders afterwards. <p>Act People</p>	<p>Continuous Improvement</p> <p>What actions can we take throughout this project to improve ourselves, the work and our organisation? What can we learn from this and previous projects? How can we support RI more effectively?</p> <p>Example action: 2023-04-04</p> <ul style="list-style-type: none"> Share resources and ideas with peers. Hold periodic reviews. Proactively raise issues at an appropriate level, e.g. project, department, organisation. Reflect systematically. Champion responsible innovation. <p>Act Process</p>



Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Research Policy

journal homepage: www.elsevier.com/locate/respol



Developing a framework for responsible innovation

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ABSTRACT

The governance of emerging science and innovation is a major challenge for contemporary democracies. In this paper we present a framework for understanding and supporting efforts aimed at 'responsible innovation'. The framework was developed in part through work with one of the first major research projects in the controversial area of geoeengineering, funded by the UK Research Councils. We describe this case study, and how this became a location to articulate and explore four integrated dimensions of responsible innovation: anticipation, reflexivity, inclusion and responsiveness. Although the framework for responsible innovation was designed for use by the UK Research Councils and the scientific communities they support, we argue that it has more general application and relevance.

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<https://www.sciencedirect.com/science/article/pii/S0048733313000930>

<https://tas.ac.uk/responsible-research-innovation/using-cards-in-ri/>



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Student question!

Where do we start if we're looking to design new technologies for social good rather than those that create harms?



Sustainable development goals (SDGs)



*"a blueprint to achieve a better and more **sustainable** future for all"*

<https://sdgs.un.org/goals>



Sustainable development goals (SDGs)

GLOBAL ISSUES

Big Data for Sustainable Development

Big Data

The volume of data in the world is increasing exponentially. In 2020, 64.2 zettabytes of data were created, that is a 314 percent increase from 2015. An increased demand for information due to the COVID-19 pandemics also contribute to higher-than-expected growth. A large share of this output is "data exhaust," or passively collected data deriving from everyday interactions with digital products or services, including mobile phones, credit cards, and social media. This deluge of digital data is known as big data. Data is growing because it is increasingly being gathered by inexpensive and numerous information-sensing, mobile devices and because the world's capacity for storing information has roughly doubled every 40 months since the 1980s.

The Data Revolution

The data revolution – which encompasses the open data movement, the rise of crowdsourcing, new ICTs for data collection, and the explosion in the availability of big data, together with the emergence of artificial intelligence and the Internet of Things – is already transforming society. Advances in computing and data science now make it possible to process and analyse big data in real time. New insights gleaned from such data mining can complement official statistics and survey data, adding depth and nuance to information on human behaviours and experiences. The integration of this new data with traditional data should produce high-quality information that is more

Sustainable Development Goals and Open Data

JOEL GURIN, LAURA MANLEY & AUDREY ARISS | SEPTEMBER 25, 2015

This page in: English



Sustainable Development Goals. Source: <http://sustainabledevelopment.un.org>

The United Nations (UN) has developed a set of action-oriented goals to achieve global sustainable development by 2030. The 17 Sustainable Development Goals (SDGs) were developed by an Open Working Group of 30 member states over a two-year process. They are designed to balance the three dimensions of sustainable development: the economic, social and environmental.

To help meet the goals, UN member states can draw on *Open Data* from governments — that is,

<https://www.un.org/en/global-issues/big-data-for-sustainable-development>

<https://blogs.worldbank.org/digital-development/sustainable-development-goals-and-open-data>



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Sustainable development goals (SDGs)

HCI and UN's Sustainable Development Goals: Responsibilities, Barriers and Opportunities

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ABSTRACT

Despite increasing interest, Sustainable HCI has been criticized for doing too little, and perhaps also at times for doing the wrong things. Still, a field like Human-Computer Interaction should aim at being part of transforming our society into a more sustainable one. But how do we do that, and, what are we aiming for?

With this workshop, we propose that HCI should start working with the new global Sustainable Development Goals (SDG) that were formally adopted by the UN in September 2015. How can Sustainable HCI be inspired by, and contribute to these goals? What should we in the field of HCI do more of, and what should we perhaps do less of? In what areas should we form partnerships in order to reach the Sustainable Development Goals and with whom should we partner?

Author Keywords
Sustainable HCI; Sustainability; Sustainable Development; Sustainable Interaction Design; Green IT; UN Sustainable Development Goals, SDG.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI); Miscellaneous.

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WORKSHOP DESCRIPTION

The field of HCI in general and the NordiCHI in particular has for a long time been in sustainability issues, for example through accessibility and work environments [2, 3] increasing number of HCI research environmental sustainability within Sustainable HCI (S-HCI). S-HCI w NordiCHI at the previous, 7th conference

Moreover, the design conference From chose sustainability as its main theme despite the fact that the field is researchers have asked if we do enough right things [1, 4, 8]? It can be daunting to tackle global problems such as climate biodiversity loss [7, 9], to name a few issues the world is and will continue to face. The remainder of the 21st century Human-Computer Interaction should show developing a sustainable society, and, what are we aiming for?

In September 2015, the UN formalized global goals that were ushered in the Millennium Development Goals "expire". The new Sustainable Development Goals consist of 17 overarching goals that aim to accomplish sustainable development by 2030. The 17 goals

¹ <http://frombusinesstobuttons.com/>

² <https://sustainabledevelopment.un.org/sdgs>

A Decade of Sustainable HCI

Connecting SHCI to the Sustainable Development Goals

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ABSTRACT

Sustainable HCI (SHCI) constitutes a relatively new research field within HCI. We have identified four literature reviews of the field conducted between 2009-2014. In this paper, we present and discuss the results of a systematic literature review of peer-reviewed conference and journal articles that have been published in the field during the last ten years (2010-2019). To this end, we apply the United Nations' Sustainable Development Goals (SDGs) as a framework to classify and discern high-level goals SHCI researchers have worked towards during this period. This paper contributes to HCI by 1) identifying Sustainable Development Goals that SHCI researchers have worked towards, 2) discerning main research trends in the field during the last decade, 3) using the SDG framework generatively to enumerate and reflect on areas that this far have not been covered by SHCI research and 4) presenting takeaways and opportunities for further research by the larger HCI community.

CCS CONCEPTS

• General and reference → Surveys and overviews; • Social and professional topics → Sustainability; • Human-centered computing → Human computer interaction (HCI); HCI theory, concepts and models.

KEYWORDS

SDG, Sustainable Development Goals, Sustainable HCI, Sustainability, Systematic Literature Review

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1 INTRODUCTION

Sustainable HCI (SHCI) is a relatively new research field within Human-Computer Interaction (HCI). While sustainability-related

HCI papers have been published for more than 15 years (e.g., [33], [7], and [45]), the CHI 2007 conference in many respects represented the starting point of systematically thinking about environmental sustainability in the context of HCI. The conference saw the formation of a special interest group (SIG) on Environmental Sustainability and Interaction [63], and a landmark paper by EH Blevis [9] that coined the term "Sustainable Interaction Design" (SID) and interaction design." Much has happened since 2007, but only four literature reviews of the field have been conducted since then: [23], [53], and [21]. In this paper, we present and discuss the results of a systematic literature review of peer-reviewed conference and journal articles that have self-identified as contributing to SHCI during the last decade (2010-2019). Our initial search yielded 182 texts, but after applying various exclusion criteria, we ended up with a corpus consisting of 71 published articles.

This paper does not seek to engage with or define what constitutes sustainability in general or in HCI. Neither do we attempt to evaluate specific technologies or research themes addressed by research in SHCI. Instead, we reflect on the focus of SHCI during the previous decade by mapping the research that has been conducted to the United Nations' 2015 Sustainable Development Goals (SDGs) [22]. The SDGs are used in many different academic disciplines and countries worldwide, and they constitute an established framework covering a spectrum of goals related to environmental, social, and economic sustainability.

The research and design works conducted in the intersection of HCI and sustainability span multiple domains (e.g., food [69], energy [51], water [58]), various perspectives (e.g., Persuasive Computing [91], Green IT [67], Collapse informatics [95], Computing within Limits [68]), different units of analysis (e.g., individual users [13], human practice [78], families [41], communities [18], companies [50]), and a variety of technologies (e.g., ICTs [86], sensors [43], mobile technology [49], etc.). It is, therefore, valuable to reflect on the high-level goals pursued by this research. In this review, we identify these goals through the lens of the Sustainable Development Goals (SDGs). Our goal is to provide a starting point for

Eriksson et al. 2016. HCI and UN's Sustainable Development Goals: Responsibilities, Barriers and Opportunities. NordiCHI 2016.

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Prep work for next week

Tasks for the next 7 days:

1. Your prep work for next week's lecture

- i. Read the Little Book of Sustainability for the Internet of Things - pages 6 through 25 (and beyond if interested!):
https://eprints.lancs.ac.uk/id/eprint/131084/1/Stead_Coulton_Lindley_Coulton.2019.The_Little_Book_of_Sustainability_for_the_Internet_of_Things.pdf
- ii. Read the paper "Three principles of sustainable interaction design, revisited. Digital Technology and Sustainability: Embracing the Paradox" – a PDF of this will be made available on the CDI1 LEARN website (as we cannot link to it openly online).

2. Complete your Class Notebook submission in MS Teams:

- i. Write 3 reflections from last week's prep work and today's lecture – what did you learn (go beyond what you wrote last week)?
- ii. Write 2 questions you have based on the prep work for us (John and Susan) to consider for our lecture next week.
- iii. Write 1 comment – something you have learned, are intrigued by, something related to your background and interests – prompted by the prep work.



Any questions?

If you have any questions about this week's lecture, contact me at :
john.vines@ed.ac.uk

If you have any questions about next week (prep work and lecture), contact Susan at : susan.lechelt@ed.ac.uk

