# ECHOES OF ETHICS ACROSS EUROPE

CALL!

User User Human User

irt~EU

Virt

An ethnography of ethical interventions into the Internet of Things

**Ester Fritsch** PhD Dissertation 2021 IT UNIVERSITY OF COPENHAGEN

#### PhD Dissertation

Title and Subtitle:	Echoes of Ethics across Europe An ethnography of ethical interventions into the Internet of Things
Author:	Ester Fritsch Department of Business IT IT University of Copenhagen
Supervisor:	Rachel Douglas-Jones Associate Professor Department of Business IT IT University of Copenhagen
Co-supervisor:	Irina Shklovski Professor Department of Communication University of Copenhagen
Submitted on:	October 16 2021
Front Page Photo:	ThingsCon Salon, Copenhagen TechFest, September 2017 Taken by the author
Front Page Design:	Terese Skovhus

## ABTRACT

This dissertation explores a recent proliferation of ethical interventions into the Internet of Things (IoT) technologies across Europe with a point of departure in empirical case studies. Recent scholarship points to a rise in explicit claims to ethics in the world of technological innovation in the Silicon Valley tech industry (Metcalf et al. 2019) and in European policymaking (Hasselbalch 2019). Still, as of yet, research investigating the 'self-described ethical' in the context of technological development has been sparse (Douglas-Jones et al., forthcoming). This dissertation contributes to such an absence by exploring explicit claims to ethics in the context of IoT creation in Europe through three different ethnographic points of entry: *documents, technologies,* and *events.* It posits ethics as a phenomenon best understood through situated analysis that takes into consideration how ethical enactments of IoT entail different practices and take varying forms as they 'claim "real-estate" for ethics' (Douglas-Jones 2017), and make IoT technologies and their stakes ethically knowable to us (Mol 2002).

Since the rise of *ubiquitous computing* (ubicomp) (Weiser 1991), visions of a world inhabited by technologies that melt seamlessly into the background of our everyday existence have flourished. With the rapid development of IoT connective devices these imaginaries have entered the world in practice. An increasing number of IoT technologies in the shape of ordinary things, such as teddy bears and lamps, now populate our worlds in invisible and yet pervasive ways. However, the promises of frictionless connectivity tied to IoT technologies continuously seem to crumble as IoT devices break down and bring different ethical dilemmas to the surface. While a lot of IoT creators show enthusiasm about the possibilities that IoT technologies engender, uncertainty and unease about the creations and worlds they bring into being simultaneously traverse European borders. Calls for attention towards ethics and IoT increasingly echo across Europe, as a diversity of bodies struggle to negotiate between the possibilities that IoT technologies offer and their ethical pitfalls. In this dissertation I argue that the form of initiatives ethically intervening into the development of IoT emergent technologies has implications for the problems they allow to emerge.

The contribution of this dissertation mainly sits at the intersection of the anthropology of ethics, the anthropology of technology and science and technology studies (STS), moving us into uncharted ethical waters empirically, methodologically and theoretically. It enters a dialogue with questions running through the recent turn towards ethics in anthropology (Faubion 2011; Laidlaw; 2014; 2017; Lambek 2010; Zigon 2007; Mattingly 2012; Fassin 2014), where an influence of Michel Foucault's (1986 [1984]) thinking inspired by virtue ethics shines through in a focus on ethical self-cultivation through ordinary practices. In this dissertation however, I point to a limitation of this approach by illuminating how instantiations of the ethical as explicitly claimed in the context of IoT creation take distinct material forms and reach beyond the human.

The dissertation therefore also speaks to ongoing STS inspired research into the ethics of technological invention. In this field a growing body of scholars emphasize the materiality of ethical values in the creation of technologies along with questions about the delegation of ethics to more than humans (Akrich 1992; Latour 1992;

Verbeek 2011; Jasanoff 2016; Jørgensen 2016; Bellacasa 2017). The analytical attention in this dissertation, however, is not directed towards how IoT connective devices embed ethical choices of their creators or whether these connected things have ethical agency. Through a comparative constellation of three ethical interventions into IoT, I argue that deliberate efforts to carve out a territory for ethics in IoT themselves entail numerous practices and have a material shape that matters for what can be ethically addressed.

My analysis of three different ethical enactments of IoT comparatively illuminate how ethics is always contextual and colored by different agendas. This calls for attention in a time where a linguistic inflation reveals that we live in 'the age of ethics' where different performances of the ethical can both reinforce or destabilize 'established orders' (Bellacasa 2017, 132). Claims to ethics in technological development are proliferating on a societal level and bring certain problems of IoT to the surface while delegating others to the background. Comparing different enactments of ethics and IoT holds a potential for critical analysis that also extends to other emergent technologies such as IoT, Artificial Intelligence (AI) or Virtual Reality (VR). Ethical interventions become prisms for understanding the ethics of IoT in new ways as they in a comparative constellation shed light on each other and the phenomenon critically and multidimensionally.

## Resumé

Denne afhandling udforsker en opblomstring af initiativer, som intervenerer etisk i udviklingen af Internet of Things (IoT) teknologier på tværs af Europa med afsæt i empiriske studier. Forskning peger på etik som et eksplicit erklæret empirisk fænomen, der vokser i omfang inden for teknologisk innovation i Silicon Valley (Metcalf et al. 2019) og i europæisk politik (Hasselbalch 2019). Der er imidlertid ikke megen forskning, som undersøger 'det selvbeskrevne etiske' i udviklingen af teknologier (Douglas-Jones et al., forthcoming). Denne afhandling bidrager til dette gab gennem en etnografisk udforskning af initiativer, som selv erklærer sig som etiske fra tre empiriske indgangsvinkler: *dokumenter*, *teknologier* og *begivenheder*. Afhandlingen foreslår, at vi bedst kan forstå etik som fænomen gennem situerede analyser, som viser, at de forskellige former, som etik tager, omfavner et utal af praksisser, når de kræver et 'rum for etik' (Douglas-Jones 2017), der gør det muligt at lære disse teknologier etisk at kende (Mol 2002).

Siden ubiquitous computing (ubicomp) (Weiser 1991) opstod som felt har visioner om en verden beboet af teknologier, som smelter ind i vores hverdag bredt sig. I kølvandet på udviklingen af IoT teknologier er disse forestillinger blevet til virkelighed. Et stigende antal ting så som bamser og lamper er nu forbundet til internettet og kan opsamle data om os og vores adfærd. IoT teknologier bebor således vores verdener på en allestedsnærværende og samtidig usynlig måde. Det er dog som om, at de løfter om friktionsløs forbundethed, som IoT teknologier er født af, falder til jorden idet disse smarte ting bryder sammen og bringer forskellige etiske dilemmaer til overfladen. Mens utallige skabere af IoT teknologier udtrykker entusiasme omkring deres potentialer, begynder en etisk uro og usikkerhed at brede sig på tværs af europæiske lande og grænser. Røster som kræver, at vi henleder vores opmærksomhed på de etiske udfordringer, som IoT teknologier bringer med sig, skaber ekkoer på tværs af Europa, idet en diversitet af aktører, som er engagerede i IoT udvikling, søger at afveje både de muligheder, som IoT teknologier bringer og deres etiske faldgrupper. I denne afhandling argumenterer jeg for, at formen af initiativer, som intervenerer etisk i IoT teknologier, har implikationer for hvilke problemer, de belyser.

Bidraget af denne afhandling placerer sig primært i et krydsfelt mellem antropologi og etik, antropologi og teknologi, samt videnskabs- og teknologistudier. Den bringer os således ind på nye etiske territorier empirisk, metodisk og teoretisk. Afhandlingen indgår i en dialog med spørgsmål, som undersøges i en nylig vending mod etik i antropologien (Faubion 2011; Laidlaw 2014; 2017; Lambek 2010; Zigon 2007; Mattingly 2012; Fassin 2014), hvor Michel Foucaults (1986 [1984]) arbejde med *virtue ethics* har en udbredt indflydelse i studier af etik, som belyser hvordan subjekter kultiveres som dydige gennem praksisser i deres hverdag. I afhandlingen fremhæves det hvordan denne tilgang kan have sine begrænsninger, da det illustreres hvordan etik i IoT kan indtage tydelige materielle former, og er mere vidtrækkende end blot det menneskelige.

Denne afhandling skriver sig dermed ind i STS-inspireret forskning omhandlende etik og teknologiske opfindelser. I dette forskningsfelt fremhæver et stigende antal af forskere den materialitet af etiske værdier, som er forbundet med udvikling af teknologier og med spørgsmål om etik, som indbefatter mere end mennesker (Akrich 1992; Latour 1992; Verbeek 2011; Jasanoff 2016; Jørgensen 2016; Bellacasa 2017). Den analytiske pointe i afhandlingen er ikke rettet mod hvordan IoT teknologier indlejrer etiske valg foretaget af deres opfindere, eller hvordan disse forbundne genstande besidder etisk agens. Gennem komparative studier af tre etiske interventioner i IoT argumenteres der for, at bevidste bestræbelser på at indkredse et territorie for etik og IoT i sig selv medfører talrige praksisser og har en materiel form, som har betydning for, hvad vi kan adressere etisk.

Min analyse af tre forskellige etiske interventioner i IoT illustrerer, hvordan etik altid er kontekstbestemt og påvirkes af forskellige agendaer. Dette kalder på en særlig opmærksomhed i en tid, hvor lingvistisk inflation afslører, at vi lever i 'etikkens tid', hvor forskellige udtryk af etik både kan forstærke og destabilisere 'den etablerede orden' (Bellacasa 2017, 132). Krav til etik i teknologisk udvikling forandrer sig på et samfundsmæssigt plan og synliggør en række bestemte problematikker ved IoT samt sætter andre problematikker i baggrunden. At sammenligne forskellige former af etik og IoT viser et potentiale for kritisk analyse, som ligeledes kan udvides til andre fremtrædende teknologier som Artificial Intelligence (AI) eller Virtual Reality (VR). Etiske interventioner fungerer dermed som prismer for at forstå etik i IoT på nye måder, da de i en komparativ konstellation både fremhæver hinanden og selve fænomenet på en kritisk og nuanceret måde.

## TABLE OF CONTENTS

INTRODUCTION	1
Echoes of ethics and IoT across europe	
Central findings and AIM	4
Three ethical interventions into IoT	5
PART I	8
AN ETHICAL MOMENTUM	8
IOT AND ETHICS: CALLS FOR ATTENTION	8
ETHICS ACROSS EUROPE AND SILICON VALLEY	
ETHICS ON A EUROPEAN AGENDA FOR THE DIGITAL	
PART II	
RESEARCH DESIGN	
A PRESENCE OF ETHICS THROUGH ITS ABSENCE	
Fieldwork	23
Methods and empirical sources	29
PART III	
ANALYTICAL FRAMEWORK	
A TURN TOWARDS ETHICS IN ANTHROPOLOGY	
An sts spin on the ethical turn	44
ENACTMENTS OF ETHICS AND IOT	46
OUTLINE OF THE DISSERTATION	
CHAPTER I	51
ENCOUNTERING THE INTERNET OF THINGS	51
THINGS	54
Definitional IoT encounters	60
TECHNOLOGICAL IOT ENCOUNTERS	
VISIONARY IO LENCOUNTERS	65 60
ONCHARTED ETHICAL WATERS AND OUR FUTURES WITH TOT	
FACTUALIZING ETHICS	75
ETHICAL EXPERTISE – ANY VOLUNTEERS?	76
THE COMPLEXITY OF ETHICS AND IOT IN EUROPEAN POLICY	
CREATING A CONSENSUAL REALITY OF IO1 WITHIN THE IO1-EG	

CHAPTER III	
CULTIVATING CARE	
Becoming aware in order to care	
A TRIANGULATION OF INVISIBILITY, CARE AND ETHICS	111
Searching for ethical ghosts in IoT	113
Re-gaining attention towards what has been made invisible	119
ENHANCING OUR ATTENTION TO NEW SPHERES AS AN ETHICAL ACT OF CARE	124
CHAPTER IV	
EXTRAORDINARY ETHICS	
	140
'DOES ANYONE ELSE FEEL THIS WAY TOO?'	
Setting a stage for ethics in IoT extraordinarily	
An IoT resurrection salon with the IoT voodoo masters	
Calls for Change	169
CHAPTER V	
(DIS)PLACEMENTS OF ETHICAL RESPONSIBILITY	
Ethical responsibility <i>in</i> IoT technologies	
Ethical response-ability <i>through</i> IoT technologies	
A COLLECTIVE OF ETHICAL RESPONSIBILITIES	
Outro	
CONCLUSION	
BIBLIOGRAPHY	200

## LIST OF ABBREVIATIONS

AI	Artificial Intelligence
COMEST	World Commission on the Ethics of Scientific Knowledge and Technology
EAG	Ethics Advisory Group
EC	European Commission
EDPS	European Data Protection Supervisor
EGE	European Group on Ethics and Science in New Technologies
ENISA	European Union Agency on Cybersecurity
ICT	Information and Communication Technologies
IERC	European Research Cluster on the Internet of Things
IRB	Institutional Review Board
ΙοΤ	Internet of Things
IoT-EG	Expert Group on the Internet of Things
PbD	Privacy by Design
RFID	Radio-frequency identification
UNESCO	The United Nations Educational Scientific and Cultural Organization
VR	Virtual Reality

VSD Value Sensitive Design

## LIST OF FIGURES

FIGURE 1. Fieldwork movements across Europe 2017-2019. By the author. 2021.	24
FIGURE 2. Mobile World Congress (MWC) Barcelona, Spain. By the author. 2017.	25
FIGURE 3. Mini Maker Faire Torino, Italy. By the author. 2017.	25
FIGURE 4. Connected Seeds and Sensors London, UK. By the author. 2017.	25
FIGURE 5. Python and IoT Amsterdam, The Netherlands. By the author. 2018.	25
FIGURE 6. 4 Years From Now (4YFN) Barcelona, Spain. By the author. 2017.	25
FIGURE 7. ThingsCon Conference Amsterdam, The Netherlands. By the author. 2017.	25
FIGURE 8. IoT events across Europe 2017-2019. By the author. 2021.	26
FIGURE 9. ThingsCon events across Europe 2017-2019. By the author. 2021.	28
FIGURE 10. Captured as a note-taking participant. By ThingsCon. 2018a.	35
FIGURE 11. Participants filling out cards at a ThingsCon salon in Copenhagen. By the author. 2017.	36
FIGURE 12. A prototyping board – Torino Mini Maker Faire. By the author. 2017.	51
FIGURE 13. Data Collector at SIDO – Lyon April. By the author. 2017.	52
FIGURE 14. 'Blue City' – the venue of a ThingsCon event Rotterdam. By ThingsCon. 2018b.	54
FIGURE 15. Connected drinks at a ThingsCon event Rotterdam. By ThingsCon 2018c.	55
FIGURE 16. Timeline – IoT-EG meeting in September 2010. By the author. 2021.	87
FIGURE 17. Timeline – IoT-EG meetings in November 2010 and February 2011. By the author. 2021.	87
FIGURE 18. Timeline – IoT-EG meeting in April 2011. By the author. 2021.	88
FIGURE 19. Timeline – IoT-EG meeting in June 2011. By the author. 2021.	88
FIGURE 20. Timeline – IoT-EG meeting in November 2011. By the author. 2021.	88
FIGURE 21. Timeline – IoT-EG meeting in February 2012. By the author. 2021.	89
FIGURE 22. Timeline – IoT-EG meeting in June 2012. By the author. 2021.	89
FIGURE 23. Timeline – IoT-EG meeting in November 2012. By the author. 2021.	89
FIGURE 24. ITU Dowse workshop November 2017. By the author and Terese Skovhus. 2021.	105
FIGURE 25. The Dowse box – ITU Dowse workshop. By the author. 2017.	106
FIGURE 26. The Dyne office. By the author. 2018.	109
FIGURE 27. Dowsing at the ITU Dowse workshop. By the author. 2017.	128
FIGURE 28. Sunset from a tower close to the Dyne office 2018. By the author and Terese Skovhus. 2021.	131
FIGURE 29. Sunset from a tower close to the Dyne office. By the author. 2018.	131
FIGURE 30. Workshop - 'Intro to designing out waste'. By ThingsCon. 2018d.	148
FIGURE 31. Workshop 'Intro to designing out waste', ThingsCon Conference. By the author. 2018.	149
FIGURE 32. Participant creating a nametag, event in Amsterdam 2017. By ThingsCon. 2017.	161
FIGURE 33. A line up of dead IoT technologies to bring back to life, ThingsCon Salon. By the author. 2019.	167
FIGURE 34. Participants experimenting with 'Resurrecting IoT darlings', ThingsCon Salon. By the author. 2019.	167
FIGURE 35. Setup before the ThingsCon Salon 'Resurrecting IoT Darlings'. By the author. 2019.	168
FIGURE 36. COMEST workshop on the 'Ethics of IoT', DesignLab, Twente. By the author. 2018.	173

## ACKNOWLEDGEMENTS

This dissertation contains a vast web of relations reaching far beyond its appearance within a bounded book. I first of all wish to thank all participants and collaborators in my PhD research for letting me into the territories for ethics and IoT that you currently carve out across Europe, and for generously taking the time to talk to me about the ethical stakes of IoT.

I also wish to thank my supervisor Rachel Douglas-Jones for patiently reading through messy drafts with eagle-eyes. For sharing ideas, texts and tweets. And for allowing space for me to find my own feet in this research and reconnect with my passion in times of trouble. Your mastering of the academic craft and curiosity is a source of inspiration. I also thank my co-supervisor Irina Shklovski for inviting me into VIRT-EU and for expanding my scholarly horizon and exposing me to fields of research that I would – perhaps – otherwise not have come across and engaged with.

Staying with the project that this research springs from, I wish to acknowledge the EU Horizon 2020 research and innovation programme co-funding this PhD under grant agreement No. 727040. I thank all participants in VIRT-EU for setting out to collectively explore questions about ethics and IoT in Europe from different disciplinary points of entry.

Further gratitude I wish to give to Hannah Knox, Baki Cakici, Astrid Oberborbeck Andersen and Marisa Cohn for your critically illuminating feedback at my midway evaluation which made me consider the contribution of this research in novel ways while strengthening preliminary analytical paths. I thank Elizabeth Povinelli for hosting me at Columbia University's department of Anthropology during my research stay abroad, and Peter-Paul Verbeek for providing an academic anchor at the University of Twente in the course of fieldwork in Amsterdam. Thanks to everyone in *Senselab* for attuning me to the frequency of exhaustion and its rejuvenating potential, and for being spread across the globe so that a busy fieldworker can catch a member in any city of the world.

Thank you, Terese Skovhus, for your diligent molding of the front page of this dissertation and photographs in Chapter III. Thanks to Jonas Fritsch for helping me make decisions about text layout and for providing critical feedback on some final pieces of writing close to the finish line. Thank you to Alison Crosley Stent for reading through the Introduction, Chapter I and V, and to Isla Badenoch for doing the same in Chapter II, III and IV. I am impressed by your talent for not only spotting typos, but also alternative ways of conveying my message with words. Thanks to Camilla Standhart for enchanting the Danish translation of my abstract.

My gratitude also extends to various bodies at the ITU supporting this research along the way: the PhD School, IT support, FM, and all my colleagues in TiP and beyond. Even though I have not been much around physically because of fieldwork combined with a research stay abroad that ended just before the pandemic started, I always feel welcome and intrigued by encounters with all of you in different corners of the square glass building. Being new at the ITU and coping with a transfer from the KU department of anthropology is all the more manageable when landing in a large cluster of PhD students generously and generitavely sharing their ideas and moments of uncertainty. Thanks to David Kadish, Sarah Homewood, Karin Ryding, Raluca Stana, Bastian Jørgensen, John Mark Burnett, Michael Hockenhull, Nanna Gorm Jensen, and Jannick Skov Hansen for being there from the start. And thank you to all PhD students entering the ITU along the way with new hope and energy. Thanks to academic companions within and beyond the ITU walls: Lise Røjskjær Pedersen, Cecilie Rubow, Maia Ebsen, Sunniva Sandbukt, Tilde Siglev, Annelie Berner, Holly Robbins, Marianne Viftrup Hedegaard, and Catherine Windey.

And finally, I wish to thank my whole family and friends for your support and for making me take a break from this PhD dissertation in creative ways. For watering my plants in the course of fieldwork, for filling up my freezer with soup, for sharing pieces of music, and for genuinely just being there. Thanks to my parents and siblings. Thank you Kristina, Lene, Camilla, Emilie, Lucy, Amar, Lisbeth, Laura, Line, Lauren and Warren. And thank you, Bo, for reminding me why this research is important at a crucial moment of doubt by introducing me to the perhaps most shitty Internet of Things like invention of all times: SKYNET.

'Ah, the future,' an engineer involved with the creation of Internet of Things (IoT) technologies states on a Wednesday morning in August 2019. Just as he is speaking, a group of children passes by us on the sidewalk that leads past the wooden café table in the Wedding district of Berlin, where we are in the middle of an interview about ethical matters at stake in the development of IoT technologies. 'And what a future we have created for them,' he adds after a short pause. It is a statement that underpins the tonality of our entire conversation.

I have invited Gabriel for an interview because of an encounter with him three months ago, when I was giving a presentation of my PhD research into ethics and IoT across Europe at a so-called *ThingsCon Salon* taking place in the Berlin *Mozilla* offices on May 6 2019. After my talk I handed out a stack of cards designed for this event to ask participants four questions addressing what is ethically at stake in IoT development. As the salon participants returned these cards to me, I noticed one signed *Disillusioned IoT Architect*. Gabriel, who signed this card, is now my interviewee, and I have asked him to elaborate on this signature of his since it made me wonder: what led him to this sense of disillusionment as a creator of IoT connective devices?

I met Gabriel for the first time at a conference hosted by ThingsCon in Amsterdam in 2017, when he was giving a talk about IoT and security. ThingsCon is a community for IoT practitioners that I have participated in during the course of fieldwork conducted periodically between 2017 and 2019. Since its beginning in Berlin 2014, ThingsCon has created multiple events at different venues for gathering IoT practitioners in Europe and increasingly beyond to talk about what it means to do 'ethical' and 'responsible' IoT in the 21st century: 'Since its inception ThingsCon has been an on- and offline environment providing a place to discuss issues within this space needed to be addressed and why' (ThingsCon 2018).

At the ThingsCon Salon in Berlin, the city where Gabriel is currently based, he is not a presenter himself, but participates in the salon as part of a small gathering of about a dozen practitioners populating the seats in the room, reflecting a shared engagement with questions of ethics in IoT. After having peripherally encountered Gabriel a couple of times at ThingsCon events across European countries, I now, during our interview, wish to learn more about why he attends these events and how come he signed his card as he did. Gabriel is educated as a computer engineer and has spent a good portion of his 33 years working on connected devices, he explains to me. Only a few minutes into the interview - which I open up by asking him about why he signed his card Disillusioned IoT Architect - he elaborates on this feeling of disillusion:

In the beginning I really honestly thought that this new technology would enable better lives for lots of people, and that technology is universally a force for good, and that of course developing technology further means better results for society. Over the course of 10 years I just sort of had it hammered into me that none of those things are the case. Technology is not necessarily a force for good and as the technology has developed it has not made things universally better for everyone.

Gabriel here shares with me how he has reached a point where he questions the inherent goodness of technology creation. He paints a picture of different dynamics in the creation of IoT technologies that mobilize this ethical unease embracing matters of *responsibility*, *respect*, *data* and *ownership*. He explains how the current market, according to him, does not allow for the development of connected devices that are respectful of peoples' privacy and security:

That's kind of existentially wrong. That's why I signed *Disillusioned Architect*. Because I don't want to build those things. I don't want to be the architect of my children's information prison.

Gabriel's sense that something is 'existentially wrong' in the development of IoT technologies, putting him at risk of being the architect of an 'information prison', brings up central characteristics of emergent IoT technologies, namely their capacity to sense, collect, actively respond to and share data, all qualities posing a range of novel ethical questions. The very definition of IoT is up for debate and covers a broad range of technologies, something I return to repeatedly throughout this dissertation. IoT technologies can embrace all kinds of ordinary things among us such as *teddy bears*, *diapers* or *streetlights*. They are now increasingly connected to the *internet* and equipped with *sensors* for data gathering that *actuators* can respond to in real time in an interactive environment where artifacts populating our surroundings participate in new ways. A connected fridge can for instance sense that you are out of milk and has the capacity to reorder it directly online (McOwan and McCallum 2017).

While sharing with me a sense excitement 'in the beginning' about new connected technologies as 'a force for good', towards the end of our interview Gabriel returns to the reflections opening up this dissertation about what technological future we are currently creating for the new generations. He explains to me how he simply does not want to be living as a 60- or 70-year-old in a world full of devices that have been created in disrespectful ways. How does Gabriel deal with his sense of disillusionment as an IoT architect and the sense that something is wrong in IoT innovation?

#### Echoes of Ethics and IoT across Europe

Gabriel's disillusionment is the starting point for this PhD dissertation, which explores the question of ethical anxieties about IoT technologies currently manifesting and proliferating across Europe. Gabriel does not stand alone with his worries about the development of IoT connective devices, and his desire to talk about ethics and IoT with me was not unique. Many practitioners during the course of my PhD research expressed a strong need to share what troubled them about IoT technologies. At public events across Europe, such as the ones initiated by the ThingsCon community where I met Gabriel, practitioners involved with IoT gather and collectively attend to the ethical unease introduced by Gabriel.

Gabriel is one of 37 interviewees taking part in this PhD research engaging with questions of ethics and IoT. Gabriel's concerns in particular revolve around how *market dynamics* sabotage the development of IoT connected devices that *respect* the *privacy* and *security* of users. Other interviewees are preoccupied with the *invisibility* of IoT technologies disguised as ordinary things that already populate our lives, such as lamps or toasters, while some are worried about the *environmental impact* of IoT in both the creation of IoT and the introduction of it into our ecosystems.

The movement from optimism and excitement about the potentials of IoT connective devices to concern and disillusionment that Gabriel portrays is a transition that many interviewees described to me. But moving beyond statements and stances, what do responses to the sense of disillusionment experienced by Gabriel look like in practice?

In recent years, a range of different voices and initiatives are sparked by an ethical unease about the advent of IoT connective devices among us and the current state of IoT development. Both the introduction of IoT in various contexts and the very processes of bringing these technologies into being are questioned. In addition to a proliferation of events where ethical matters at stake in IoT are collectively addressed, such as gatherings initiated by the ThingsCon community, this is also expressed in a recent spread of IoT manifestos. Together with my co-authors I analyzed 28 of these documents published between

2010 and 2017 as an early empirical enquiry into the phenomenon of ethics in IoT. In the manifestos IoT designers, developers and practitioners share frustration and uncertainty about the technologies that they themselves are co-creating, altering the world with unknown future consequences (Fritsch et al. 2018). As a loud and revolutionary genre a manifesto marks a moment of crisis: "LOOK!" It says. "NOW! HERE!" (Parent 2001, xx in Fritsch et al. 2018, 2). The recent intensity of published manifestos about IoT is indicative of a desire for change, a call for attention and a facilitation of publics for debate (Fritsch et al. 2018). Different initiatives directing our attention towards ethics and IoT technologies currently echoing across Europe are the empirical locus point of this dissertation.

#### Central Findings and Aim

This research project investigates a variety of ethical interventions into IoT in a European context. Over the course of three years (2017-2019) I have been travelling around Europe looking into how ethics is enacted around the development of IoT technologies. Based on an analysis of three empirical cases this thesis sets out to show how ethics and IoT is not a phenomenon in the singular, but continuously enacted in different material forms embracing *writings*, *technologies* and *events*.

This PhD dissertation exists at the intersection of several academic fields. I situate its main contribution within ongoing discussions about how to approach ethics ethnographically in anthropology, while drawing on literature from science and technology studies (STS) to argue that the phenomenon of ethics and IoT is enacted in multiple ways. *Ethics and IoT* is thus the empirical case while *enactments* of this phenomenon are the analytical object of this dissertation.

In an 'ethical turn' within the field of anthropology a range of scholars discuss how to ethnographically approach ethics (Faubion 2011; Zigon 2007; Laidlaw 2014; 2017; Lambek 2010; Mattingly 2012; Fassin 2014). Simultaneously, an increasing number of scholars within the rapidly expanding field of the 'anthropology of technology' are currently discussing the relation between anthropology, technology and the future (Bruun and Wahlberg, forthcoming), how to do ethnography in a data-saturated world (Knox and Nafus 2018) while carrying out studies of algorithms (Seaver 2017), traps (Jimenéz and Nahum-Claudel 2019), virtual reality (Andersen et al., forthcoming), the role of data in Amazonian climate science (Walford 2012), and attentional technologies (Pedersen et al., forthcoming) to name a few. Within the growing field of an anthropology of technology, a cluster of scholars focus on questions about 'ethics, values and morality' in relation to technology more particularly (Douglas-Jones et al. forthcoming). Anthropologist and STS scholar Rachel Douglas-Jones et al. emphasize that an anthropology of ethics and technology must take 'seriously the space of the self-described ethical as itself an object of anthropological investigation' (Ibid.).

As brought to our attention by Douglas-Jones in an earlier study of an Asia-Pacific NGO that trains ethics committees, deliberate efforts aimed at 'making room for ethics' and helping 'others see ethics as important' involves a range of material practices (2017, 13;14). If the ethical interventions into IoT that we currently see across Europe are marking out a space for and 'claiming "real estate" for ethics' (Ibid., 14), then what characterizes the respective rooms for ethics in IoT that these interventions open up for? What material practices are part of bringing them into being? Why are they created in the first place? Who initiates these ethical interventions into IoT? And how are different bodies seeking to make ethics relevant to IoT development in Europe through such initiatives?

Through fieldwork ethnographers can approach technological development and questions about ethics from different empirical points of entry, for instance by following users of technologies, scientists or tech organizations (Douglas-Jones et al., forthcoming). This dissertation springs from an anthropological approach and offers three routes into ethnographically examining enactments of self-declared initiatives about ethics and IoT in a European context which I introduce after posing the following double-edged research question:

What responses are there in Europe to questions about ethics and IoT, and how do interventions into IoT that are explicitly declared as ethical allow for different problems of IoT to emerge?

#### Three Ethical Interventions into IoT

This dissertation explores the two questions above from different ethnographic points of departure through an analysis of three empirical cases where ethical enactments of IoT technologies across Europe play out. Overall, I analyze three kinds of ethical interventions into IoT in the shape of *writings*, *technologies* and *events* while acknowledging that there are overlaps across these categories, as will become clear during the analysis.

The first room for ethics in IoT that I analyze comes into being through such documents as the abovementioned manifestos authored by different actors involved in IoT development. While these colorful documents critically engage with the current state of IoT development through written words that loudly call for change in a genre characterized by linguistic brevity, the main piece of writing about ethics in IoT that I analyze in this dissertation is of a rather different type. It is a so-called fact sheet with both the concepts of 'ethics' and 'IoT' appearing in its title: *Fact sheet - Ethics Subgroup IoT – Version 4.0* (Van den Hoven 2013). This document is published as the culmination of a two-year process of work carried out by an IoT Expert Group (IoT-EG) convened by the European Commission (EC) in 2010. An analysis of this document illuminates how an enactment of ethics and IoT in the shape of a fact sheet entails an ordering of the ethical complexity that IoT brings about, and how it ties into Europe's identity and geopolitical position in an increasingly digital economy where ethics in IoT holds a particular financial promise for the European project.

In a similar effort to explore and introduce ideas of ethics in IoT to the broader public yet in an entirely different way, the second ethical enactment of IoT that I analyze is a technology called The Dowse Box. Dowse is created by the organization Dyne, a non-profit foundry committed to developing: 'free and open source software and services' (Dyne n.d.a) with its headquarters in a harbour zone of Amsterdam, more specifically in a building floating on water that I visited regularly in the course of fieldwork between February and May 2018. This box has the capacity 'to make visible the invisible', revealing to us the network activities of connected artifacts populating our surroundings. As the creators of the Dowse box explicitly write: 'The goals for Dowse are in first place ethical' (Dyne 2017, 8). Springing from a challenge about the difficulty of relating ethically to something that is not visible to us, Dowse materially intervenes into a world increasingly populated by IoT technologies through an enhancement of our sensorial apparatus that allows us to sense the pervasive presence of IoT that is otherwise imperceptible to us. An analysis of Dowse illustrates how this box seeks to make us care about ethics in a more than human world of IoT through the act of making visible the invisible, enabling our response-ability towards ethical matters at stake in IoT.

A third and final room for ethics in IoT that I analyze is a string of events in the shape of *salons* and *conferences* where actors involved with IoT in various ways gather across European borders to meet up in person and discuss and share their experiences, visions and uncertainties about IoT and our future. IoT events include everything from big gatherings and tech expos such as the *Mobile World Congress* to salons organized by Things-Con taking place in small corners of Berlin, Amsterdam, Rotterdam, Copenhagen, Milan, Cologne, Darmstadt, Antwerp and Eindhoven. As mentioned, ThingsCon is a community that embraces a diversity of practitioners engaging with IoT - such as representatives from both empirical cases above - in various ways. In ThingsCon, questions about 'ethical' and 'responsible' IoT are especially catered for in an 'environment providing a place to discuss' these matters (ThingsCon 2018). I have been involved with ThingsCon periodically yet consistently during the course of fieldwork from March 2017 to September 2019, participating in events that show how an enactment of ethics and IoT entail practices to design settings that materially open up for public participation (Marres and Lezaun 2011).

In these different ethical enactments of IoT we encounter numerous actors in this dissertation: experts invited into the work of European policy on ethics and IoT; hackers, coders, artists, and a box that ethically intervenes in IoT, as well as numerous kinds of IoT practitioners across fields of engagements getting involved with ethical issues in IoT through public gatherings.

In studies of ethics in the context of technological development and how it intervenes in our lives, Douglas-Jones et al. encourage us to not approach technologies normatively as either beneficial or harmful (forthcoming). Rather, we might gain valuable insights from engaging empirically with questions of 'ethics, values and morality from *inside* the practices under study' (Ibid.) where they refer to the work of anthropologist Jeanette Pols (2018) on 'empirical ethics' as a suggestion for how to ethnographically engage with ethical practices. Accordingly, rather than implementing a normative layer on top of the world, I seek to learn about ethics through the empirical material in this study.

The cases I have just introduced are empirical windows into an ethnographic exploration of how ethics and IoT is enacted in different ways. At the same time, bringing these cases together comparatively shows how initiatives attending to matters of ethics and IoT are currently growing in number and variation across Europe. What has brought about this proliferation of ethical interventions into IoT? There is no one answer to this. Nevertheless, in recent years different examples of IoT creations have exposed some of the vulnerabilities of these technological inventions, and they have been raised in public and framed in the language of ethics, in turn feeding into what some have observed to be a broader international crisis in the tech industry (Moss and Metcalf 2020), one that currently manifests in various ways.

A valuable contribution of ethnographic studies engaging with ethics and technology is the critical analytical work of narrating and making different dilemmas visible (Douglas-Jones et al. forthcoming). My narration of this research and its contribution continues with a contextualization where I point to a growing attention towards matters of ethics and IoT in I) public media, II) academic research, and III) political funding initiatives such as the EU HORIZON 2020 programme that this PhD research is partly funded by. Following on from this, I situate the apparent rise of ethics and IoT as an explicit object of attention in a broader context of concern that goes beyond European borders. In doing so I make visible how challenges at stake in technological development echo not only across Europe, but also in Silicon Valley, increasingly exposed to the public from *within* various tech environments (Metcalf et al. 2019) or in EU policy initiatives (Hasselbalch 2019), framed in the language of ethics. This introduction now splits into three parts: 1) An Ethical Momentum, 2) Research Design, and 3) Analytical Framework before it ends with an overview of its chapters.

## Part I

#### An Ethical Momentum

#### IoT and Ethics: Calls for Attention

In 2017 the concepts of 'IoT Platform' and 'Connected Home' peaked on the Gartner Hype Cycle of inflated expectations (Gartner 2017) just as I started my PhD research, situating IoT in a broader atmosphere of 'hype and hope for the future' that characterizes many sociotechnical imaginaries of digitalization (Hockenhull and Cohn 2021, 302). Optimistic rhetoric about the transformative potential of IoT is widespread (Mui 2016; Bigos 2017). Yet while the advent of IoT brings with it a lot of hype around the promises of new connected devices, in recent years there has been much discussion about IoT in public media directing our attention towards unintended consequences of these technologies. Experts warn us against the risk of being surveilled 24/7 by smart speakers such as Google Home (Franck 2018), security breaches allowing for access to private data from devices like teddy bears (Samuels 2017), or misbehavior of 'smart devices' such as spam emails from a connected fridge (McOwan and McCallum 2017). Some experts and organizations publicly warn against IoT (Franck 2018), while others shed light on challenges of IoT technologies in the language of ethics as they write about 'the new ethics of the internet of things' (McOwan and McCallum 2017). Attention is directed towards IoT vulnerabilities such as privacy violations or security dangers manifesting for instance through a spying smart speaker, a spamming fridge, or a hacked teddy bear. These are simultaneously technical challenges and ethical issues to tackle as our lives are increasingly permeated by the smart behavior of connected technologies (Ibid).

Examples of IoT technologies that are problematized in public, where experts share their worries, concretize how IoT technologies introduce new challenges that are framed as ethical, especially when they manifest through unforeseen weaknesses in their design.

Anthropologist Michael Lambek sheds light on how ethics is often 'turned explicit' exactly through 'breaches' or in moments when we encounter 'ethical problems or issues in which the right thing to do is unknown or hotly contested' (2010, 2). In the cases raised in public where IoT technologies do not behave as intended or embed malicious intentions from creators, the issues that people are worried about seem to be increasingly framed in the language of ethics. This research contributes to such growing societal concerns about ethics and IoT by empirically investigating what problems and potentials different calls for ethics in IoT are trying to direct our attention towards.

Secondly, ethics and IoT are increasingly drawing attention across a range of scholarly fields. Below I briefly introduce existing research into ethics in IoT and describe how this dissertation contributes to these studies by ethnographically examining empirical cases where enactments of ethics in IoT unfold across Europe.

Several scholars are currently dealing with how to approach, understand and articulate ethics in relation to IoT. A lot has been said throughout the past decade about ethics within the field of *ubiquitous computing* (ubicomp) (Weiser 1991), which several scholars point to as the origin of IoT, a point I return to in the next chapter of this dissertation (Bohn et al. 2005; Dodge and Kitchin 2007; Brown and Adams 2007; Greenfield 2008). However, my point here is that the body of studies focusing explicitly on ethics and IoT is rapidly expanding, and encompasses research in academic fields as diverse as economics (Popescul and Georgescu 2013), information systems (Ebersold and Glass 2016), engineering and design (Baldini et al. 2016), smart cities (Tzafestas 2018), and philosophy (Allhoff and Henschke 2018).

An overall observation that I wish to bring forward is that ethics in these studies is broken into a range of different themes and ordered in various lists and diagrams. Prominent ethically loaded topics across this body of literature are issues of *privacy*, *data*, *security*, *surveillance*, *users* and more, all being dedicated whole bodies of literature which implicitly yet, importantly, equally deal with ethics and IoT. An example of this approach is a literature review undertaken by James Scheibner et al. (2021) that looks into ethical issues arising when using IoT technologies in citizen science research. Analyzing a body of publications systematically derived from a literature search containing three root concepts – 'citizen science', 'ethics' and 'Internet of Things' – Scheibner et al., much like I do, zoom in on an explicit linguistic combination of 'ethics' and 'IoT'. They point to 'autonomy and data privacy', 'data quality', and 'intellectual property' as three main categories of ethical issues (Ibid.). In addition, they focus on the legal implications of how ethical challenges in this context are communicated, reported, and handled (Ibid.).

In a study of ethics and IoT springing from the field of philosophy, Allhoff and Henschke explain that when looking into emergent technologies more broadly, ethics often lags behind technological innovation (2018, 56). Applying this gaze in the context of IoT technologies, they believe that insufficient attention is paid to identifying the novel features

of IoT technologies, particularly when attending to questions of ethics (Ibid.). They articulate their paper as a beginning and a continuation of a critical investigation of IoT's ethical dimensions, and they encourage others to continue the exploration (Ibid., 56;63).

In my PhD project I take up this mission. But while other scholars are crafting ethical repertoires by breaking ethics into topics and localizing the *content* of chosen ethical thematics in IoT, my focus is on ethics as a *practice*. This analytical gaze is also introduced in a recent publication by sociologist Funda Ustek-Spilda et al. (2019) where they engage with the ethics of IoT and the social milieus of technology developers. I approach ethics and IoT as a material-semiotic phenomenon that is *enacted* differently depending on from which ethnographic route one enters it. Rather than exploring what ethics 'is' in the context of IoT, I explore how ethics 'is done' and comes into being, attending to how different formations and materialities characterize interventions into IoT that are explicitly declared to be ethical. As I move beyond thinking about ethics in diagrams and topics, I contribute to this ongoing research into ethics and IoT through an ethnographic study of the phenomenon in three different instantiations where the self-declared ethical is my empirical research object. The aim of this thesis is not to find out what ethics inherently is or entails, but to explore the forms that ethics take in practice when the concept is claimed through an analysis of empirical cases.

I have pointed to how ethics and IoT is increasingly gaining scholarly attention while also locating my research contribution in the context of the literature on ethics and IoT. My research does not merely contribute to research explicitly attending to ethics and IoT technologies. It also enters ongoing discussions within both 1) the field of anthropology about how to approach ethics, and 2) STS-inspired studies engaging with ethics in technology. I return to this in more detail in the third part of this introduction where I introduce scholarly discussions about how to approach ethics.

In addition to being a topic of attention in public media and in current research, ethics and IoT also sparks political interest, which brings me to introduce the VIRT-EU project which this PhD is part of as a third call for attention towards ethics and IoT. The project VIRT-EU: 'Values and Ethics in Innovation for Responsible Technology in Europe' funded by the EU Horizon 2020 programme (2014-2020) supports research and innovation 'aimed at securing Europe's global competitiveness', as well as driving 'economic growth' and producing 'world-class science' (EC n.d.). VIRT-EU's objective paints a picture of how a future pervasively populated by connective technologies 'hold[s] both enormous potential and pose[s] profound challenges for European society' (CORDIS n.d.). VIRT-EU brings forward the General Data Protection Regulation (GDPR) in EU law to illustrate a growing string of problems with emergent data practices addressed through a regulatory initiative focusing on the protection of data, privacy and consent that was implemented on May 25 2018 (EU GDPR 2018). Rather than through regulation, VIRT-EU aims to address 'these concerns at the point of design through researching and

intervening upon the development cultures and ethics of the next-generation IoT innovators' (CORDIS n.d.).

The project reflects funding priorities, and the deployment of academic research in the name of finding solutions for better technological futures through attempts to better understand and implement ethics into the very design and development of IoT technologies. The outputs of VIRT-EU embrace a set of tools available in a so-called VIRT-EU service package (VIRT-EU 2019) along with publications about ethics and IoT focusing on 'imaginaries in the social milieu of technology developers' (Ustek-Spilda et al. 2019), and a Twitter-based study of the European IoT (Ustek-Spilda et al. 2021). These three outputs reflect the involvement of researchers in VIRT-EU working across ethnography, design, law and social network analysis to approach the topic of ethics and IoT interdisciplinarily. VIRT-EU reflects an interest in ethically intervening into IoT development in Europe. I turn now to the broader context of ethics in technological development in which calls for ethics and IoT are located.

#### Ethics across Europe and Silicon Valley

It is not only in Europe that calls for ethics in technological development are sprouting, as the empirical cases in this dissertation demonstrate. In recent years, concern about the role of technology in our lives has been raised through tech scandals and revelations to the public from inside the tech industry (Metcalf et al. 2019). Examples include Cambridge Analytica's role in turning data into politically loaded targeting and the US presidential election in 2016 (Hern 2018), a hidden microphone in the Google Nest Guard device (Lee 2019), algorithmic bias (Ledford 2019), Apple Siri privacy leaks (Hern 2019), and the Snowden disclosures about NSA mass surveillance in 2013 (MacAskill and Dance 2013). The latter two scandals of privacy violations are revelatory critiques, and calls for transparency from inside the tech industry equally echo in the recently released documentary *The Social Dilemma* (2020). Here tech experts share how 'the technology that connects us' simultaneously 'divides us'; 'controls us'; 'monetizes us' (The Social Dilemma 2020).

In line with revelations about data collection, surveillance and monetization, one book has, since its publication in 2019, sparked global debate about digital technologies and the role of tech companies such as Google, Microsoft, Amazon and Facebook, namely *The Age of Surveillance Capitalism - The Fight for the Future at the New Frontier of Power* by Shoshana Zuboff (2019). In this publication Zuboff introduces the concept of *surveillance capitalism* to denote an economic order where big data is capital and points to IoT in particular as an illustration of just how pervasively new information technologies enter our private homes (Ibid.). In an article from January 2019, computational engineering professor Moche Y. Vardi responds to Zuboff's book in the monthly journal of the Association for Computing Machinery by raising the question: 'Are We Having an Ethical Crisis in Computing?' (2019, 7).

Vardi's question shows how Zuboff's critical work is drawn into the field of computing through the language of ethics, questioning the very processes that are part of bringing new technologies into being from inside a site of technological invention. According to researchers in data and society Emanuel Moss and Jacob Metcalf (2020), challenges of technology are increasingly being framed in the language of ethics. They notice a red thread runs through the numerous crises springing from the tech industry in recent years, namely that they all expose problematic aspects of technology where: 'The keyword inextricably bound up with discussions of these problems has been ethics' (Ibid.). Below I introduce two recent studies engaging ethnographically with the question of ethics and technology through empirical cases of initiatives that are explicitly framed as ethical, one in the context of tech innovation in Silicon Valley and the other of European policymaking. These pieces allow me to situate my research comparatively in relation to other scholars working ethnographically with similar empirical issues and to contextualize the empirical phenomena that I analyze in a broader societal context.

Sparked by the observation that the concept of ethics is proliferating in the wake of recent crises that 'appear to the public as spectacular revelations about real or potential harms that technology has produced' (Metcalf et al. 2019, 452), Metcalf and Moss, together with data and society researcher danah boyd, explore an increase in employees hired in the role of 'ethics owners' within the Silicon Valley tech industry (Ibid., 451). They note a paradox: while an abundance of claims about a lack of ethics in technological development flourish, ethics seems to be an increasingly hot product in Silicon Valley (Ibid., 449). Given the 'strain that ethics poses for the tech industry' (Ibid., 453) and the way it gets caught up in the logics 'that repeatedly animate its ethical crises' (Ibid., 451), Metcalf et al. look into what is at stake in these explicit claims to ethics in different companies.

Their analysis draws on qualitative data including texts and interviews with 17 people who are engaged with matters of ethics in the tech companies where they work. One voice from inside the tech industry emphasizes to Metcalf et al. how people in tech are not 'unethical' and points to a recent change: 'There are people who have made a career out of being disaffected tech people who regret what they built [even though they] profited from it' (Ibid., 457). While touching upon this individual sense of unease among some tech developers, which resonates with the opening vignette of this dissertation and Gabriel's sense of disillusionment, Metcalf et al. focus on looking critically into three dominant logics in the Silicon Valley tech industry animating ethics in this context (Ibid., 460). As I did in a European context, Metcalf et al. thus notice a rise in explicit claims to ethics in the U.S. tech industry. Given that "ethics" is a capacious term, holding a range of meanings' (Ibid., 452), it is a challenge, according to Metcalf et al., to capture what it means in the tech industry (Ibid.). Their study examines how, whenever the concept of ethics is claimed, it becomes relevant to ask: Who contributes to discourses around how ethics is approached? (Ibid, 453). In an article building on from their study, Moss and Metcalf highlight this point by introducing how power is tied to ethics:

It is a concept around which power is contested: **who gets to decide what ethics** *is* will determine much about what kinds of interventions technology can make in all of our lives. (Moss and Metcalf 2020).

The attention towards the influence of whoever claims the concept of ethics and the power in doing so for our future with technology ties into the insight about how different logics color ethics (Metcalf et al. 2019, 460), making it relevant to ask where a given ethical initiative springs from. Building on from this, but in a European context of technological innovation, researcher and cofounder of the European thinkdotank *DataEthics* Gry Hasselbalch (2019) in another recent ethnographic study that took place in a period around 2017 also engages with a phenomenon that is explicitly framed as ethical, namely 'data ethics' initiatives currently flourishing in European policymaking. Hasselbalch brings forward how problems evolving around information technologies are increasingly framed as ethical in the context of European policymaking, not least in the wake of GDPR (Ibid., 2;13). Like Metcalf et al., yet from a different ethnographic point of departure, Hasselbalch brings up how there is 'no shared definition' of ethics in data ethics initiatives (Ibid., 3). Hasselbalch argues that 'different actors and forces [...] mould definitions of "data ethics" in European policy-making' (Ibid., 1), emphasizing that any definition of data ethics is inevitably colored by values and politics (Ibid., 3).

While Metcalf et al. interviewed people from inside the tech industry, Hasselbalch's argument springs from an analysis of events she has attended along with reading policy reports and documents (Ibid., 213). I introduce these studies of 'ethics owners' in the Silicon Valley tech industry and 'data ethics' initiatives in European policymaking since they ethnographically engage with some of the same questions that I do in my research. How can we approach and understand an increase in phenomena that are explicitly described as ethical in the context of tech development at this moment in time? Given that these three studies spring from ethnographic work carried out in the same period of time in both different and overlapping geographical zones and contexts, something must be at stake in a broader societal light making it valuable to inspect explicit claims to ethics in tech more closely. Building on from Hasselbalch's study, I turn to a proliferation of initiatives engaging with ethics and digital technologies in other European projects in addition to those about 'data ethics'.

#### Ethics on a European Agenda for the Digital

VIRT-EU is one among several projects receiving EU funding from the EU HORIZON 2020 programme to explore questions of ethics and digital technologies in recent years. Others include *SHERPA: Shaping the ethical dimensions of smart information systems* (*SIS*) – *a European perspective* 2018-2021 (CORDIS n.d.*a*), *REELER: Responsible Ethical Learning with RoboticsRobots* 2017-2019 (CORDIS n.d.*b*) and *TechEthos: Ethics* 

*for Technologies with High Socio-Economic Impact* 2021-2023 (CORDIS n.d.*c*). This wave of EU-funded projects looking into ethics and technology expresses a political interest in the topic that also emerges in other initiatives engaging with digital technologies and the ethical challenges they pose in a European context influenced by the GDPR.

As foregrounded in the study by Hasselbalch, 'data ethics' is high on the agenda in European policymaking, a theme echoed in the report *Towards a Digital Ethics* published by the European Data Protection Supervisor (EDPS) and written by the Ethics Advisory Group (EAG). In the opening statement of this report, the EAG describes how it 'has carried out its work against the backdrop of two significant social-political moments' (EDPS EAG 2018, 5): one being 'a growing interest in ethical issues both in the public and in the private spheres', the second one an effectuation of the GDPR in May 2018 (Ibid.). In the foreword for this report, the European Data Protection Supervisor Giovanni Buttarelli shares the belief that ethics has gained traction in recent years as a consequence of the GDPR:

When I first espoused ethics three years ago, while the legislative procedure for the adoption of the EU's General Data Protection Regulation was still underway, it is fair to say my initiative raised a few eyebrows. Today, ethics and data protection are intertwined like never before. (Ibid., 1)

Buttarelli goes on to explain how 'data protection authorities now face ethical questions that legal analysis alone cannot address', introducing a relation between ethics and law touched on by the EAG when it states that it is not straightforward to localize 'where the law ends and where ethics begins' (Ibid., 10). The EAG cites IoT technologies, together with *Artificial Intelligence* (AI) and *Cloud Computing*, as being among 'technological trends' as it calls for a 'new digital ethics' (Ibid., 6). In the following quotation the EAG makes a case for what this ethics is *not* about:

The EAG expressly avoids an instrumental approach to ethics of a kind that would result in an ethical checklist or set of measures that, once accomplished, would essentially exhaust ethical reflection and release its practitioners from further discussion. (Ibid., 8)

What this excerpt conveys is that releasing practitioners from ethical reflection through a checklist would be the antithesis of ethics. The report instead provides 'a vocabulary of ethics for the digital age' (Ibid., 8), bringing forward different values such as 'dignity', 'autonomy' and 'trust' while also situating ethics in a larger context of 'the digital age' characterized by innovation, (data) markets and sociocultural changes (Ibid., 15). What is particularly interesting in this report is how the whole European project is at stake in this work on digital ethics, a point I return to in Chapter II, where I analyze the above-mentioned fact sheet on ethics and IoT published as the culmination of work carried out by an expert group on IoT initiated by the EC. In the EAG report on a digital ethics, data protection is presented as an ecosystem rooted in:

The European project itself, that of unifying the values drawn from a shared historical experience with a process of industrial, political, economic and social integration of States, in order to sustain peace, collaboration, social welfare and economic development. This project is sustained by the common destiny of all European citizens and by the principles and practices embodied in the European institutions. (Ibid., 6)

In a publication written by another high-level expert group on AI (AI HLEG) set up by the EC titled *Ethical Guidelines for a Trustworthy AI*, the interest in ethics and a mission to 'strengthen European values' (EC AI HLEG 2019, 4) is also reflected. In this document, under the subheadline 'An Ethical AI', it is written that ethics is one of three components of a 'Trustworthy AI' requiring more than compliance with the law (Ibid., 5). This yet again illustrates an ambiguous relation between laws and ethics that Allhoff and Henschke also highlight in their research into ethics and IoT springing from the field of philosophy where, as touched on earlier, they point to how ethics often lags behind technological innovation in the context of emergent technologies (2018, 56). According to the AI HLEG:

Laws are not always up to speed with technological developments, can at times be out of step with ethical norms or may simply not be well suited to addressing certain issues. For AI systems to be trustworthy, they should hence also be ethical, ensuring alignment with ethical norms. (EC AI HLEG 2019, 6-7)

The argument for ethical AI systems thus introduces ethics as playing an active role, especially in moments where the laws fall short for different reasons. What I wish to illustrate with these examples of initiatives that put ethics and digital technologies on the European agenda is a political incentive to engage with this thematic through various means embracing funding, publications and regulation. The bringing together of examples illustrating a growing interest in ethics and digital technologies in European policy provides a broader perspective for understanding the context in which my PhD research, qua its affiliation with VIRT-EU, takes part.

I have in the two previous sections contextualized my research in a broader societal and scholarly context where an interest in ethics and technological development is proliferating. I have shown how this is expressed in a range of initiatives that are explicitly framed as ethical globally with an emphasis on Europe and IoT technologies, while drawing the contours of how many questions of ethics in IoT they mobilize. In the next part of this introduction, I will return to the specificities of this PhD research and look into its research design and methodologies to concretize how I have ethnographically approached ethics and IoT. That ethnography is often a process where research projects are continuously in the making rather than a coherent and predictable engagement is widely recognized, regardless of how intentionally designed we present our projects to be (Baarts 2003, Hastrup 2003, Narayan 2012, Sjørslev 1988). My path into the European ethics and

IoT scape has involved numerous surprises, along with ongoing insights, challenging my initial assumptions and shaping the design of my research.

In the following sections I unfold my PhD fieldwork in more detail. As in any good tale, ethnographies entail *turning points* (Narayan 2012, 11), and in my research such a moment occurred during the very first months of my PhD project as I started to notice a proliferation of ethical interventions into IoT that challenged my assumptions and called for a redesign of my project. As I paint a picture of the ethnographic base for this dissertation, I situate my research and choices along the way in a broader empirical context and momentum that initiatives about ethics and IoT – and thus the cases up for closer analysis in this dissertation – spring from and take part in. This part of the introduction is divided into three sections on 1) an ethnographic turning point, 2) fieldwork, and 3) methods. However, all the themes inform one another.

When and how did I come to a realization that became a turning point in my research? I will now go back in time and invite you to join the ethnographic journey I have been through.

## Part II

#### Research Design

#### A Presence of Ethics through its Absence

On a late afternoon towards the end of February 2017, just about two months into my PhD project, a string of striking words enter my email inbox. I am in Barcelona attending a StartUp event called *Four Years From Now* (4YFN) unfolding as part of the *Mobile World Congress* (MWC) 2017, an annual occasion for technology developers from all over the world to gather and showcase their novel developments. In the email, a tech developer thanks me for dropping by his booth at the conference, letting me know that he appreciates our conversation about ethics, which is a topic that he 'feels strongly about', as he puts it, while embodying a sense that 'no one else ever talks about it'.

The words surprise me for several reasons. At the point where they reach me, I have been wandering around from booth to booth at 4YFN for days to inspect a range of new IoT technologies while hoping to simultaneously catch a few IoT developers to talk about ethics and IoT development as an empirical entry into my PhD project.

4YFN is an event where new IoT technologies are showcased, as startups hope to attract investments and get their developments on the market. A mentor in the accelerator initiative Startupbootcamp in Barcelona who I encounter at the venue, nevertheless, ironically tells me – as he relates to the four-year horizon pointed to by the name of the event – that most of the startups at the event will not even exist four years from now. As an emerging technology, IoT is full of momentum and promise, and it is the topic of conversation at many other events. But while many developers at MWC and 4YFN are eager to talk about their new technologies, they fall silent when asked openly what ethics and IoT might be about, mostly hesitantly hinting at concerns around *data*, *privacy* and *security* (all topics that are conceptually tied to matters with legal implications). The email reveals to me that until this point I had been overwhelmed by a feeling of being a rather intrusive anthropologist every time I create what feels like slightly awkward situations when approaching IoT developers and inviting them to talk about ethics. At an event celebrating the innovativeness of new IoT devices, ethics in particular was potentially neither the most pressing nor the easiest topic to talk about, leading to quite a few moments of silence. An expression of gratitude towards a conversation about ethics and technology all of a sudden altered this sense of intrusion, as a tech developer shared with me how he found the topic both valuable and important.

So even though it seemed on the surface that ethics was not a prominent issue at the 4YFN event, the email in my inbox this February afternoon indicates that ethics is actually something that some tech developers 'feel strongly about', to put it in the words of the developer who contacts me. That being said, the email also reveals that these concerns are perhaps not always easy to express or share, indicated by the thankfulness for a conversation that opened up a space to talk about ethics, a subject 'no one ever talks about'. Ethics is difficult to reflect upon or articulate in words, I quickly realize, as I seek to use the unease of introducing ethics to feel through the space of ethics for IoT technology developers.

4YFN and MWC are just two IoT technology events among 24 that I attended in the course of fieldwork between January 2017 and September 2019 looking for where, how and among whom IoT development and ethics play out in Europe. The interesting thing is that while many events celebrate the potentials of the shiny new IoT technologies, a layer that is invisible on the surface is an uncertainty running through all events as a strong undercurrent that brings together otherwise disconnected field sites. The embrace of a space to talk about ethics expressed in the email was not a longing by one single developer, it quickly turned out. As described in the opening of this introduction I discovered that IoT connective devices and the ethical implications tied to their coming into being was explicitly addressed in different initiatives.

The developer in my opening email expresses the *absence of ethics* as a topic for reflection. This in part echoes the assumption mentioned earlier that excitement around technological creation may be clouding critique, concern and care among developers of technologies in light of the ethical questions they raise. Nonetheless, voices from within the tech industry in recent years, as the vignette at the start of this introduction illustrates, challenge this assumption. Some point to how anthropology allows one to gain insights into both what is explicitly said in social communities and what is not said, inviting us to notice surprising silences in the field (Baarts 2003, 37; Hastrup 2003, 208). Gaps in narratives can be analytical openings for understanding absences (Rubow 2003, 237). By deliberately initiating conversations about ethics and IoT at the larger conferences, I somehow opened up a space for a conversation that puzzled me because of its apparent absence.

What counts as anthropological knowledge is fluid (Faubion 2009, 152-153), and our insights should embrace the disturbance and disorder brought to our own universe through fieldwork, where our involvement requires that to a certain extent we let ourselves be momentarily confused and destabilized (Sjørslev 1988, 164). Awkwardness, discomfort and internal conflicts during fieldwork may clear a path to unexpected insights into the worlds being studied (Hume and Mulcock 2004, xvi;xviii) and it is emphasized that observations and reactions can lead to important insights, especially in our first encounters with new fields (Jackson 2010, 41). At the larger tech conferences such as MWC and 4YFN in Barcelona, I felt an unease springing from the upbeat pulse of the events reflecting a high pace of technological innovation where ethics was regarded as 'too slow' to take a prominent space, as some participants explained to me.

Nonetheless, though ethics revealed itself to me in the context of IoT through its absence at large tech events, in the months after attending 4YFN I discovered that a wave of initiatives were seeking to open up that very space to talk about ethics and IoT that the developer in the email was calling for. It came to my attention that meetups were sprouting across Europe to discuss IoT development, ethics and responsibility, and the undercurrent of concern and uncertainty running through all events was perhaps most clearly expressed in the proliferation of IoT manifestos mentioned earlier (Fritsch et al. 2018). Studying this current of uncertainty and ethical unease has become a central challenge of my thesis. It is a somewhat tacit and affective, yet increasingly formalized and explicit, object of study.

#### Ethics Explicit in IoT as an Ethnographic Turning Point

Through fieldwork and engagements with different kinds of ethnographic material, I am in this dissertation seeking to understand what ethics and IoT is about in a European context – as are many practitioners involved with IoT development in various ways, I realized shortly after initiating my PhD project during the spring of 2017. When entering new field sites, things often turn out differently than what we imagined in our research design. There could be unforeseen challenges of access (Hammersley and Atkinson 1995, 53) or the fieldwork may bring insights that puzzle us and lead our attention in unexpected directions (Baarts 2003, 38; Hastrup 2003, 405; Narayan 2012, 11; Sjørslev 1988, 160). My encounter with how IoT practitioners across Europe are deeply concerned about and engaged with questions of ethics led to a change in focus and a somewhat serendipitous redesign of my whole project. Below I unpack this change in more detail, as it gives contextual and analytical insights into my project.

Studying ethics as an explicit empirical object was not always the aim of my PhD project, which was going to be more directed towards exploring the tacit everyday practices of ethics as they unfolded, both in the development of IoT connective devices and in the creation of technologies that ethically intervened in IoT. This interest in how ethics would

unfold through creational processes was sparked by previous fieldwork in an Italian ecovillage situated in the pre-Alpine Piemonte region, where I cultivated plants for six months in the spring of 2014. In this study I looked into ethics as a more than human and material practice unfolding continuously through the everyday interactions across cultivators, plants, technologies, spirits, raindrops, wind and a range of other forces all coming together in the cultivation of fields and crops. In the process of bringing plants into being, ethical dilemmas with implications for the quality of edible plants flourished, for instance around the use of fertilizer in case of illness.

My initial idea for this PhD project was to transfer the attention that I had heightened through my research in the Italian ecovillage to a different context, looking into how ethics is practiced as IoT technologies are cultivated rather than plants, yet similarly entailing multiple choices and values materializing in the technologies. From the outset I was interested in ethics as a process entailing material translations of value-based choices, with a focus on the materiality of ethics and its ontological implications. I wanted to approach ethics as not merely a layer of ideals on top of the world, but as integrated into it.

Inspired by a focus on the quotidian realities of ethics in anthropology, highlighted especially in the so-called 'ethical turn' within the anthropological discipline (Faubion 2011; Laidlaw 2014; 2017; Lambek 2010; Mattingly 2012; Fassin 2014), which I return to in the section where I introduce my analytical framework, I had imagined that I would observe and participate in everyday practices of ethics carried out among IoT creators. I aspired to notice enactments of values, virtues and ethical practices from day to day and how these tied materially into the IoT technologies that people were creating.

I applied for this PhD project to do a comparative study of the organization Dyne in Amsterdam and their critical intervention into IoT development, the Dowse Box, introduced earlier, and of the *Arduino*<sup>1</sup> IoT community and *Casa Jasmina*<sup>2</sup> – an IoT showcase home – in Torino. The study I had in mind would build on my interest sparked during my fieldwork in the Italian ecovillage in how ethics plays out beyond the human. I would focus on the materiality of how ethics is enacted differently in the case of the Dowse box, as will be unfolded in Chapter III, and in IoT creational experiments in the Arduino community embracing DIY initiatives among designers, engineers, students, hobbyists and more (Arduino 2018). I scheduled jumping directly into conducting fieldwork in the spring semester of 2017 to explore these cases, and I had then dedicated the spring semester of 2018 to do some open follow-up fieldwork. I had planned that this would take

<sup>&</sup>lt;sup>1</sup> Arduino is both an open-source board for prototyping IoT and other technologies developed in Ivrea and an international community of makers. Arduino boards are 'able to read inputs - light on a sensor, a finger on a button' that it then turns 'into an output - activating a motor, turning on an LED'. Through an 'Arduino programming language' and an 'Arduino Software (IDE) you can tell your board what to do by sending a set of instructions to the microcontroller on the board' (Arduino 2018). <sup>2</sup> *Casa Jasmina* is a project about IoT in the home born in 2015 and geographically located in Torino. Casa Jasmina is not merely a home in the shape of an apartment, but also 'a combination of lab, gallery space and B&B' exploring IoT through a 'process of building things, installing things, removing things, repairing and maintaining things, storing things, recording and linking to things' (Casa Jasmina n.d.).

shape depending on where my attention was directed and what doors would open through the first round of fieldwork. Though my original research proposal had not anticipated that ethics would be as explicit a concern among IoT tech creators as it turned out to be, I had to follow the newly found realization during my first phase of fieldwork, where it became clear to me that ethics in relation to IoT was a rapidly growing area of concern addressed in many different initiatives across Europe. This altered both my research design as well as the narratives framing my research project.

In a sense, part of what I had designed as the fundamental base of my PhD project did come to pass. I have not fully abandoned my initial PhD project idea and field sites, since both the Arduino community and Dyne are part of my fieldwork as anticipated. Nevertheless, so are numerous other physical sites, documents and communities. I knew that Dyne and Dowse was an explicit ethical intervention into IoT development, but little did I know that many other kinds of ethical IoT initiatives existed in various shapes. I had not anticipated the broadness and multi-sited character of my PhD fieldwork that would emerge when I started following formations of ethics around the creation of emerging IoT connective devices in different European countries.

As I began to realize how many IoT developers were already paying attention to ethics within the first months of starting my PhD project, the turning point in my research was in reality one of many smaller ones that altogether created a whole new constellation of field sites for me. I have focused on people engaging rather explicitly with questions around ethics and IoT, though initially I would have analyzed the actual development of the devices and the material questions of ethics as a more tacit everyday practice of design choices. Instead, I started asking myself questions such as: What communities are built around concerns and anxieties about ethics in IoT? Where do discussions of ethics and IoT happen in Europe?

This ties into my early fieldwork in the larger mission of VIRT-EU to both understand and map out the ethical practices of IoT developers in 'Europe' (CORDIS n.d.), a geographically broad span and comparative scope that, according to Joe Deville et al. (2016), characterizes projects funded by the EU. VIRT-EU has shaped my project, especially in its initial phase where, as part of an international team of ethnographers across ITU and LSE, I was 'scanning' the European IoT landscape to both understand and map out the ethical practices of IoT developers in collaboration with another social network analysis team in the project (CORDIS n.d.). '[C]ollaborations shape the object of comparison just as the object shapes collaborations' (Deville et al. 2016, 33). In the case of my PhD project, collaborations in the VIRT-EU project, as well the EU drive for comparison, geographically broadened the scope of my field beyond the initial research proposal, which had been directed towards only two empirical sites over a longer period. Instead, I ended up travelling around Europe as, together with other VIRT-EU researchers, I explored how to empirically open up and grasp where and how the combination of IoT development and ethics was happening. The first year of my PhD project thus deviated from my research design, where I had imagined I would spend longer periods in the Arduino community in Torino and in the Dyne Amsterdam offices. Carried by an open curiosity towards what ethics and IoT might be about from different developers' perspectives as an entry into my research influenced by VIRT-EU, I ended up conducting numerous shorter field trips to Torino and Amsterdam as planned, but also to London, Berlin, Lyon, Barcelona and Copenhagen. Here I attended international expos, conferences, meetups and development spaces to encounter IoT technologies and their developers.

Deville et al. shed light on how 'there has been a very visible push by funders for researchers to adopt comparative methods' (2016, 24). They bring forward the EU's Horizon 2020 funding programme as a particular example of this. They write that a call for comparison in this programme is framed as a matter of approaching the "complexity" of the challenges facing Europe' (Ibid.). These are considered to 'go beyond national borders and thus call for more complex comparative analyses to develop a base upon which national and European policies can be better understood' (European Union 2013, 162 in Deville et al. 2016, 24). As reflected in the VIRT-EU project and as articulated by Deville et al. in this quote, international collaboration is a central dimension of many EU-funded projects, where comparisons between nations are encouraged. According to Deville et al. these kinds of comparisons are less anchored in research problems and rather 'driven by the political need of the EU to make sense of the EU as a "union" of cultural practices and their internal differences' (Deville et al. 2016, 30).

My PhD research is to a certain extent framed by this political wish qua its funding. Yet, while this project in its initial phase was influenced by the mission of VIRT-EU, its original contribution lies in its focus on ethnographically engaging with interventions into IoT that are explicitly framed in the language of ethics. One thing that I aim to show is that many rooms are made for ethics (Douglas-Jones 2017) which becomes particularly apparent in a comparative constellation of three instantiations of the ethical in IoT. There is no one central space in Europe where explicit engagements with ethics and IoT take place. People gather and disperse in manifestos, EU documents, events, networks and more, which is why my fieldwork has stretched across so many different sites. As mentioned, in this dissertation I zoom in on three particular cases to illustrate that ethics and IoT are enacted in very different ways, depending on the ethnographic point of departure through which one enters the phenomenon. In this section I have detailed how key ethnographic moments and insights shaped the direction of my PhD research alongside the nature of the VIRT-EU project. My attention was summoned to follow empirical traces and, in doing so, leave behind others. This is also reflected in my research design, as I describe below.

#### Fieldwork

Methodologically I used many of the classical methods anchored in anthropology such as participation, observation, interviews, analysis of documents, different kinds of mappings, visualizations, interventions and more. The design of my fieldwork is quite serendipitous and dispersed, something I now elaborate on in more detail. When I expressed my concern about the fragmented nature of both my fieldwork and my empirical material to professor of anthropology and STS Lucy Suchman, she asked me: 'What does this tell you about IoT?' Visions of IoT draw an image of everything being coherently connected, embodying ideals of ubicomp about the disappearance of technologies that will increasingly melt seamlessly into the background of our everyday existence (Weiser 1991), as I elaborate on in Chapter I. However, a world inhabited by IoT connective devices and the creational processes leading to their existence has in the light of ethics turned out to be anything but a matter of coherence and connectivity. Rather, fragmentation, frictions and paradoxes seem to be inherent features of the field whenever ethics and IoT are discussed.

That gaps, fragmentation, incompleteness and absences characterize the fields we are moving within, challenging any assumptions about a holistic and neat whole, is addressed in ongoing anthropological discussions, not least in the recently published Manifesto for Patchwork Ethnography (Günel et al. 2020). In this piece, Günel et al. engage with ongoing problematizations of 'traditional anthropological fieldwork' where a practice of and a tale about anthropologists spending a long period of time in one chosen place, often far from 'home', has prevailed (Ibid.). Günel et al. enter ongoing reflections about multisited fieldwork (Marcus 1995, Candea 2007, Cook et al. 2012), and with the concept patchwork ethnography they 'refer to ethnographic processes and protocols designed around short-term field visits, using fragmentary yet rigorous data' (Günel et al. 2020). They emphasize that short-term field visits are not to be understood as 'one-time' affairs, and that many characterizations of 'traditional fieldwork' still count in patchwork ethnography such as 'long-term commitments, language proficiency, contextual knowledge, and slow thinking' (Ibid.). Günel et al. articulate why a seemingly serendipitously patchworked kind of fieldwork such as the one I have carried out is not necessarily at the expense of ethnographic commitments over time, contextualization and 'slow thinking' in engagements with bodies of data that are somewhat rigorously fragmentary.

Baird touches upon a similar point in a study of security fairs in Europe and Northern America, where he brings attention to how rich insights can be gained from doing what he refers to as *multi-sited event ethnography* (2017, 191). In line with Günel et al. (2020), Baird emphasizes the value of seemingly messy ethnographic engagements in the context of collecting very diverse sources of empirical material from multiple events that can then be analytically compared (2017, 191).

I will now characterize the design of my fieldwork in detail to draw the contours of 'the field' in its fragmentation, not least because of the event-based nature of my ethnographic engagements spanning nine cities in seven European countries. As several anthropologists have pointed out, 'the field' is in a constant state of becoming, including during the process of analysis (Coleman and Collins 2006, 12; Dalsgaard and Nielsen 2013, 3). My 'field' has come into being through ongoing new fieldwork insights and analytical engagements with empirical material along the way. As the following description of my ethnographic research will reveal, my fieldwork is designed in a patchwork manner (Günel et al. 2020), continuously evolving through various field visits and encounters as they unfolded over three years.

My PhD project stretched from 2017 to 2020, with three periods more intensively dedicated to fieldwork. During fieldwork I attended 24 events in nine cities in seven European countries, with some needing recurrent visits. Nine events took place in a different country than the one I was based in when the event took place. Because of this, as I elaborate on below in a more detailed description of my research design, I tactically based myself abroad for the duration of the project, more specifically in Amsterdam from January to April 2018 and Berlin from May to August 2019. I detail the logistics of doing fieldwork after the first year of the project, when I scanned Europe for the empirical state of ethics and IoT involving numerous return travels from Copenhagen to disparate yet connected sites. This led me into many different 'rooms for ethics' (Douglas-Jones 2017) in the context of IoT, embracing everything from large-scale conferences such as the MWC in Barcelona to community gardens in London and a factory building on the outskirts of Torino. Overall, my fieldwork looks like the visualization below illustrating my ethnographic movements across Europe.



FIGURE I. Fieldwork movements across Europe 2017-2019

## **FIELD SITES**



FIGURE 2. Mobile World Congress (MWC) Barcelona, Spain March 2017



FIGURE 3. Mini Maker Faire Torino, Italy May 2017



FIGURE 4. Connected Seeds and Sensors London, UK February 2017



FIGURE 5. Python and IoT Amsterdam, The Netherlands March 2018



FIGURE 6. 4 Years From Now (4YFN) Barcelona, Spain February 2017



FIGURE 7. ThingsCon Conference Amsterdam, The Netherlands November – December 2017
The fieldwork conducted for my PhD can be divided into three phases of varying duration in the consecutive years of 2017, 2018 and 2019. While these three phases draw the contours of my fieldwork and demarcate my more focused ethnographic engagements, there were several events and moments of importance that played out between these periods. My fieldwork has been stitched together by an ethnographic engagement over time. One could say I have practiced a long-term ethnographic commitment through short events along with more long-term ethnographic engagements. Below you see an overview of all the fieldwork events I attended throughout my PhD research, sparking the movements across Europe illustrated in the figure above. Below that, I describe each of the three main phases of my fieldwork in more detail.



FIGURE 8. IoT events across Europe 2017-2019

Fieldwork carried out in Phase I (January 2017 to December 2017) is characterized by participation in different IoT events in Barcelona, London, Berlin, Lyon, Torino, Copenhagen and Amsterdam. In this first phase I sought to grasp what IoT development and ethics was all about on a European level by scanning and jumping directly into different sites where I could encounter IoT developers at tech events where IoT technologies played a prominent role. As the overview of fieldwork events above reveals, a concentration of ethnographic engagements in Barcelona dominates the first two months. This geographical site was on my radar as a result of interests in VIRT-EU reaching beyond this particular project. However, during the first phase of fieldwork an encounter with IoT technologies beyond tech events came my way and moved my ethnographic gaze towards two other European sites where critical IoT discussions on ethics were beginning to play an increasingly prominent role.

The encounter I refer to was with the IoT manifestos that I and my colleagues kept coming across (Fritsch et al. 2018). The manifestos turned out to be rich empirical sources

for a range of reasons – not only because of their content, which pointed to ethical issues at stake in IoT development and painted a picture of the potentially dystopian world we might be moving towards, but also because they presented numerous voices contributing to discussions about ethics and IoT across Europe. In doing so these documents provided empirical points of entry into my research which I had not anticipated. Our analysis of these documents, which were published between 2010-2017, proved analytically fruitful with regard to mapping out current events in Europe in terms of IoT developments and ethics, since many manifesto authors participate in events like ThingsCon, including Dyne staff.

Many of the manifestos were authored by technology practitioners engaged with IoT in various ways, and a significant number of the authors were based in the Netherlands. With my attention focused by the revolutionary calls in these documents, in Phase II of the fieldwork I dived deeper into the IoT development ecologies in Amsterdam and Rotterdam to better understand these critical IoT engagements unfolding outside the large tech expos. A lot of activity around ethics and IoT seemed to spring from these two geographical sites. In addition to noticing that many IoT manifestos were authored by developers based in Amsterdam, I realized that the ThingsCon community, which I had encountered during my first phase of fieldwork, was very active in the Netherlands more broadly.

From January 15 2018 to April 18 2018 I had my ethnographic base in Amsterdam. In this period I hung out in the Dyne offices regularly, in addition to continually attending a range of events (see above) including ThingsCon initiatives that Dyne members and the Dowse box also occasionally participated in. In addition to this, I paid recurrent visits to five different IoT development sites where I did tours, conducted interviews and held informal conversations. During this period, I talked to people running various IoT communities, networks and events who were engaging with ethics in IoT, though not always explicitly focusing on it as their main agenda, such as *The Things Network*, *Sensemakers* and *Waag Society*.

In this phase of fieldwork I came across another collection of documents that sparked my interest and opened up a comparative space that allowed me to analytically apprehend my fieldwork endeavors and empirical material anew, with implications for the design of my third phase of fieldwork. After returning home and working towards my midway report and evaluation, I encountered the IoT-EG initiated by the EC in 2010 and its fact sheet on ethics and IoT. Documents published in relation to the work of the IoT-EG – including the fact sheet on ethics and IoT along with minutes from ten meetings depicting the two-year process that this document was a culmination of – were accessible through the EC's *Register of Commission Experts Groups* (2010a) at the time. The IoT-EG case offers insights into a more bureaucratized and institutionalized European engagement with ethics and IoT, operating very differently than the sprouting critical initiatives I had engaged with so far and thus revealing a comparative ethnographic space.

In the third and final phase of fieldwork I had my ethnographic base in Berlin for three months from May 1 to July 30 2019. I tactically placed myself so that I could attend two central ThingsCon events, one in Berlin and one in Rotterdam, that I knew would take place during this time, which I also spent conducting a series of semi-structured interviews with ThingsCon members based in these geographical zones. From May 2019 to December 2019 I conducted 17 interviews with ThingsCon participants based on my ethnographic involvement over time, as I elaborate on shortly.



FIGURE 9. ThingsCon events across Europe 2017-2019

Gradually over the course of my fieldwork I zoomed in on IoT developments and ethics from different *empirical points of entry* and with different scopes. This came about over time as I scanned Europe for the combination of ethics, IoT and developers, attending around 24 different IoT development events and hanging out with different kinds of developers and others who were critically engaged with the creation of IoT technologies, as well as reading through documents as ethnographic artifacts, experimenting with the Dowse box and holding both informal conversations and formal interviews. Just as I was approaching ethics in IoT, so were others, and this shaped the design of both my research and my fieldwork, as I have shown above. I identified and localized three different empirical points of entry into ethics and IoT, presented in this dissertation as: Writings (IoT-EG), technologies (Dyne) and events (ThingsCon). When studying ethics, there is a risk of treating ethics 'normatively rather than ethnographically' and foreclosing 'prematurely on what it makes sense to include within the ethical' (Laidlaw 2017, 7). In the redesign of my fieldwork I was confronted with this dilemma, especially at the ethnographic turning point where, as a response to encounters with explicit claims to ethics in IoT, I

embraced an invitation to take on a different position from which to approach my object of study. Rather than focusing on implicit everyday enactments of ethics in the development of IoT technologies, I chose to learn about ethics from people explicitly initiating extraordinary ethical interventions into IoT development.

Acknowledging my own ignorance about technological aspects of ethical questions posed in the context of IoT creation, I continuously felt an unease with approaching ethics as an immanent practice among tech creators. The words of Laidlaw articulate this intuitive sensation that I faced during my first fieldwork visits where I did not feel in a position to foreclose even what could be included within ethics in the context of IoT. I felt a danger of approaching the field normatively if I was to point out how ethics was continuously practiced among IoT creators in the process of developing new connective devices, even though ethical dimensions were not articulated explicitly as such.

The proliferation of explicit claims to ethics provided me with empirical points of entry into ethics and IoT where I could ethnographically learn about the phenomenon through fieldwork by asking: What does ethics mean to the different actors claiming the concept in relation to IoT? When and how is ethics turned into an explicit empirical object? Thus, I somehow turned my own ethical sense of unease into a research contribution on ethics. The different characters of the empirical cases that I analyze in this dissertation, where the phenomenon of ethics and IoT presents itself in a variety of material-semiotic forms that allow for different ethical problems of IoT to emerge, call for varying methodological approaches. Below I introduce my methods and empirical sources in more detail.

#### Methods and Empirical Sources

What does my patchworked and constructed empirical archive embrace (Günel et al. 2020), and what methodological takes have been part of bringing this into being? As I outline below, my analysis draws on a range of different empirical sources and kinds of ethnographic engagement including document analysis, interviews, participant observation and collaborative intervention. As the description of my fieldwork reveals, the empirical material generated through my ethnographic engagements reaches far beyond the ethical interventions into IoT that are up for analysis in the three main chapters of this dissertation. Yet the fieldwork as a whole gave me a contextual understanding that enabled insights into these three empirical instantiations of ethics and IoT.

#### Documents

That pieces of writing hold rich ethnographic insights is widely acknowledged, feeding into a long tradition across different sciences where studies of documents in a variety of forms are granted a prominent place (Riles 2006, 2). Documents can in a broad sense include everything from bus tickets to archived letters (Ibid., 5), and ethnographers often

encounter documents in one shape or another during fieldwork (Ibid., 4). As already indicated, different collections of documents that I came across during fieldwork have been a central empirical source for exploring how ethics and IoT is enacted in the shape of written pieces. The most prominent documents in this regard are the 28 IoT manifestos, as well as the IoT-EG fact sheet on ethics and IoT (Van den Hoven 2013) accompanied by ten documents with minutes from IoT-EG meetings. The latter ten provide insights into the processual creation of the fact sheet on ethics and IoT (IoT-EG 2010-2012). In Chapter II I analyze the collection of these 11 IoT-EG documents, which I first encountered in the fall of 2018, about 18 months into my PhD project. Van den Hoven's IoT-EG fact sheet on ethics and IoT is 21 pages while the pile of minutes, publicly accessible through the EC's *Register of Commission Experts Groups* (2010a) grows thicker with each IoT-EG meeting. As discussions in the IoT-EG intensify, it is agreed at the fourth meeting on April 19 2011 that the meetings have to be longer (IoT-EG 2011b, 8). At the first meeting the minutes are six pages long; by the 10th meeting they are 17 pages. All in all, the minutes total 122 pages bring the body of IoT-EG documents to 143 pages.

In the cases of both Dyne and ThingsCon, writings are part of the empirical material I analyze, even though the forms that ethical enactments of IoT take in these cases do not focus on ethics in the shape of documents per se. In my analysis of the Dowse box I include writings in the shape of the *Dowse Interface Design Guidelines 0.4* (Dyne, Bonelli 2015), a *Dowse Whitepaper version 1.2* (Dyne 2017), a Dowse manifesto (Dyne n.d.c), Jaromil's doctoral thesis titled *Algorithmic Sovereignty* (Roio 2018) and various webpages, as well as Github sources. Similarly, in my analysis of ThingsCon I include excerpts from their main webpage, descriptions of various programmes of events as well as their *RIOT – The State of Responsible IoT –* publications (2017; 2018; 2019; 2020), which is a yearly collection of essays where members of this community explore questions of IoT, responsibility and ethics.

I have thus ethnographically read through more than 500 pages of written empirical material, where the analysis of IoT manifestos with colleagues (Fritsch et al. 2018) as well as the IoT-EG document analysis, has involved careful readings and re-readings of this data along with an open coding technique to filter and organize the words through central attributes and themes that recur (DeWalt and DeWalt 2011). I have coded through the documents to highlight any themes that emerge as the authors work through questions of ethics in IoT, but have also drawn on scholarly inspiration that points to the richness of the documents, allowing me to delve into aspects of the material I may otherwise have missed. In my analysis, especially of the collection of IoT-EG documents, I am inspired by the thinking of anthropologist and legal scholar Annelise Riles who refers to documents as 'artifacts of modern knowledge practices' (2006, 2) and anthropologist and ethnologist Laura Stark who examines meeting minutes in particular (2011, 233). Together, Stark and Riles directed my attention in the reading of ethnographic writings towards questions about the production of documents through practices, as well as how documents take part in the constitution of different modern bodies (Riles 2006, 5), produce 'social actors' (Stark 2011, 237) and create 'realities' (Ibid., 242). These topics are at stake in the IoT-EG documents that I analyze, where the process of producing the IoT-EG fact sheet on ethics and IoT is partly transparent through the meeting minutes. The themes introduced here will be part of my analysis of these documents.

#### Interviews

During the first year of my PhD project, 2017, when I was travelling across Europe to attend various IoT events, I had numerous informal conversations with IoT developers where I gradually became familiar with the IoT lingo, a lexicon peculiar to the community that was completely foreign at the start. Building on from insights and contacts cultivated in this first phase of fieldwork, I conducted 37 semi-structured interviews between 2018 and 2019 with actors involved in IoT and questions of ethics in different ways.

In the second phase of fieldwork, when I was based in Amsterdam, I interviewed 19 actors engaged with IoT in very diverse ways, yet all attending to ethical matters at stake in IoT from their different points of departure. In addition to four members of Dyne – my primary field site in this period – four interviewees were facilitators of IoT communities in Amsterdam promoting DIY initiatives. I interviewed another nine people working in four different companies developing digital products, including IoT connective solutions. Two of these were based in Amsterdam and two in Rotterdam. The interviews I conducted in this period took place in locations including the Dyne offices, three different IoT DIY headquarters, four different IoT companies and public cafés.

In the third phase of fieldwork, May to December 2019, which was when I focused on the ThingsCon community, I semi-structurally interviewed 17 ThingsCon members engaged with the community in different ways. By the time I started conducting this series of interviews I had been following the ThingsCon community for more than two years. Through participation in ThingsCon initiatives, observation, informal conversations, event presentations, flyers, ThingsCon publications and more, I had made notes on a range of topics and themes, causing wonder that I wished to explore in even more detail through the interviews with chosen members of this community. Before the arranged conversations I prepared my interviews (Rubow 2003). Each interview was designed to both entail questions directed at the specific interviewee and questions posed to all interviewed ThingsCon participants about this community in order to be able to compare reflections across individual voices. Like the second phase of fieldwork, these interviews took place in different locations, including the interlocutors' offices and public cafés across Berlin. In addition, given that members of ThingsCon are based in different European countries, I started conducting interviews online as it was logistically too challenging to meet up with everyone in person, not least because I was transferring to New York for my research stay abroad just after my stay in Berlin. Below I outline the kinds of participant observation I conducted.

#### Participant Observation

The practice of doing an interview can be regarded as a participatory anthropological engagement (Rubow 2003). In the case of my fieldwork, for instance, it reflects that doing the interviews involved field visits to various sites and built upon an ethnographic engagement over time. Participation and observation (DeWalt and DeWalt 2010) were part of my fieldwork in different ways, as I outline below. The writing of field notes was a prominent methodological practice (Narayan 2012; Rubow et al. 2018), and my archive of notes includes close ethnographic descriptions of places, settings, actors and situations, as well as information about date, time and more (Narayan 2012). As my co-authors and I have analyzed in more detail, field notes embrace different techniques and media from paper and pen to audio recordings, computers, iPads and smartphones (Rubow et al. 2018). Drawing on such a range of techniques, with their different strengths and challenges for note taking, has allowed me to capture my observations and participatory experiences across very diverse and scattered field sites.

During my fieldwork in Amsterdam in the spring of 2018 I visited the Dyne offices regularly. One observation that emerged through participation in the everyday life of the Dyne staffers was that the boundaries of this field site could not be confined to the walls of the Dyne office. In addition to a whole lot of tapping on keyboards, 'the everyday' in the Dyne office was always full of events, travels, flexibility and periodic intensities – not to speak of activities outside the office that Dyne members thought were important for me to follow in order to understand their philosophy. Clearly, the ethical practices of IoT development for this group of developers reach far beyond the office and working hours (the latter concept is practically non-existent). The field reaches from the Dyne underground office on a houseboat to Frederico's top-floor studio at the other end of the city. From coding to co-op, from basement to roof-top, from Amsterdam to Italy only just begins to describe its range.

As I illustrate in Chapter III, one cannot separate the box from the environment in which it came into being. Hanging out with Dyne did not so much mean that I got a chance to see Dowse in action, as they did not work intensively on the box while I was there. What the time I spent here offered me was an environmental understanding of the coming into being of this box. In the recently published article by Ustek-Spilda et al. (2019) already introduced, they inspired by virtue ethics investigate how ethics plays out in practice among technology developers. Their inquiry encompasses not only the value of attending to individual actions, but also the social milieus in which ethics plays out (Ibid., 1). Inspired by this, I decided that collective Dyne activities, including how its members enacted ethics, would be part of my analysis of the Dowse box. In addition to doing interviews and hanging out in the Dyne offices, I conducted participant observation through

what Baird (2017, 191) refers to as a *multi-sited event ethnography*, as the graphs above illustrate in more detail.

#### Events

As conveyed in the previous sections, my fieldwork embraced a range of events, from large tech expos with thousands of participants to small intimate meetups with less than 20 people present. What can one gain ethnographically from attending events? Studies of events and case studies were introduced to the anthropological discipline decades ago, not least through the Manchester School (Dalsgaard and Nielsen 2013, 7), and more recently it has been argued that events studied over time can become analytical prisms or comparative juxtapositions when brought together in different constellations (Mitchell 1983, 194; Baird 2017). As pointed to by Baird, based on a study of security fairs in Europe and Northern America, methodological questions arise when seeking to 'apply ethnographic methods to short-term events' (2017, 189).

According to Baird, 'multi-sited event ethnography is a composite approach to studying local environments and events that have distinct transnational elements at play', and he details how it 'involves juxtaposing and relating fieldwork materials from two or more events' (Ibid.). Ethnographic material from multiple events across international borders thus reaches beyond any of these in the singular, holding a potential to shed 'light on connections, categories, and practices that demarcate a transversal social field' (Ibid.).

If knowledge practices play out within and across events (Ibid., 189) one might ask: How do participants come to know and share reflections about ethics and IoT through attending events? And what have I learned from doing participant observation at events over the course of three years? Like Baird, I have spent hours in exhibit halls doing participant observation and having conversations in these surroundings, as well as during lunch buffets. Attending the larger tech conferences allowed me to understand how a different space is designed when reflections around ethics and IoT are the explicit point of a public gathering, which I would not have noticed had I jumped directly into ThingsCon events from the moment I initiated my PhD fieldwork. At some point I created visual vignettes as an analytical move during a workshop in ETHOS Lab at an ITU hosted by Mascha Gugganig and Rachel Douglas-Jones where the differences in settings and affective tonalities at various events that I had participated in manifested very clearly. ThingsCon events look very different from larger tech conferences, which made me interested in what it takes to materially carve out a space for ethics in IoT. I analyze this aspect in Chapter IV. As I illustrate, events are therefore not merely windows into a discursive analysis that conveys public displays and performances of various actors (Ibid., 191). Noticing the design and materiality of events catering to discussions about ethics and IoT provides rich examples of a carefully designed ethical enactment of IoT in the shape of public gatherings and the material practices that they entail (Marres and Lezaun 2011) in attempts to make 'room for ethics' (Douglas-Jones 2017).

As the event overviews above convey, I attended four ThingsCon salons, each two or three hours long, two in Berlin, one in Rotterdan and one in Copenhagen, as well as three conferences, each two or three days, one in Amsterdam, one in Rotterdam and one in Berlin. With reference to anthropologist George Marcus (1995), Baird describes how tracing a phenomenon like knowledge practices at diverse events 'allows for comparison of transversals and commonalities across spaces and scales' (Baird 2017, 189). The researcher can follow 'issues and themes of interest' within and between sites (Ibid.). While this has certainly been the case for me through my ethnographic engagement with the ThingsCon community, I also wish to bring forward a point echoing recent critiques of multi-sited ethnography as reproducing ideals of a coherent ethnographic whole that can be reached through engagements where topics are followed across diverse sites (Candea 2007; Cook et al. 2009). I am not seeking to capture a greater European whole through my fieldwork by engaging different sites. However, I want to highlight how initiatives addressing ethics in IoT travel across borders in Europe, with all the possibilities and frictions that this might entail, as well as opening a comparative analytical space that sheds light on how enactments of ethics in IoT take different forms.

In line with reflections by Günel et al. (2020) about the kinds of archives 'we construct when we do research in fragmented, patchworked ways', Baird points to how the very collection of diverse sources of empirical material from numerous events is not an ordered and coherent endeavor (2017, 191). However, it is exactly this 'empirical messiness' that 'makes it possible to compare complex data from multiple events, allowing us to track knowledges and practices across multiple spaces' (Ibid.), as my analysis in Chapter IV exemplifies. Baird also highlights a broad spectrum of empirical materials that are part of doing event ethnography, including field notes about observations, experiences and atmospheres; photos, videos and audio recordings; conference literature, flyers, presentations, advertisements, exhibition items and more. As Baird puts it, I would 'leave each event with an event bag full of new materials, including stacks of glossy advertisements, leaving me with a wealth of material to sort and compare' (Ibid., 190).

Zooming in on the empirical archive created through field notes from attendance at numerous events, as well as being able to take notes 'on the go' using whatever techniques possible at a given event, is common as I have reflected upon with my co-authors (Rubow et al. 2018). During the events I attended, registering my ethnographic impressions while being immersed in the field was sometimes difficult because of an abundance of insights to note down, yet very little time and space to do so with a packed event programme. This was a challenge, not least in a collaborative attempt to share notes and insights, especially in the first phase of fieldwork, an aspiration in collaborative ethnographic fieldwork coming with practical and ethical considerations that my co-authors and I have addressed (Fritsch et al. 2020). I return to this thematic in the final section about the design of my research on ethics. But first, I dwell for a moment on my different kinds of participation in the ThingsCon community during the course of fieldwork.

#### ThingsCon: Modes of Participation

In my ethnographic involvement with the ThingsCon community, I changed position several times through undertaking different kinds of participation. A triangulation of participatory modes encompasses how first I participated in organized ThingsCon events between 2017 and 2019; second, in September 2017 I co-organized a ThingsCon salon during a TechFest event in Copenhagen and third, in May 2019 I gave a presentation at a ThingsCon salon in Berlin. In addition, I co-authored an essay for the 2018 ThingsCon RIOT Report (Fritsch et al. 2018a), and thus actively participated in the discourse around 'The State of Responsible IoT' that this community creates.



FIGURE 10. Captured as a note-taking participant (ThingsCon 2018a).

In five of the seven ThingsCon events that I attended as part of my fieldwork, I was a participant in initiatives organized by ThingsCon without being a presenter or co-organizer. In these five events I attended talks and workshops where I had the chance to sense the atmosphere of spaces opened up by ThingsCon to talk about ethics and IoT along with noticing the kinds of topics brought up, including how they were dealt with and the controversies they brought about, revealing important dynamics among participants in this community.

On September 6 2017, from 5.30 to 7.30pm I took on the role of co-organizing a ThingsCon Salon as a collaboration between ThingsCon and the VIRT-EU project. The salon took place in Kødbyen, Copenhagen, as part of *TechFest*, where questions of how technologies impact our lives are explored. The theme of this salon was 'Ethics and Responsibility in IoT' and the venue, a space called 'Bakken', was chosen to support a pro-

tected atmosphere for discussing the topic<sup>3</sup>. The venue is depicted on the front page of this dissertation, and I elaborate on the salon in Chapter IV. At this salon we handed out cards for participants to write down questions for the presenters to gain insight into ethical content springing from the talks. The cards were also intended to establish contacts for fieldwork so that people could share with us information about how they were engaged with IoT and interested in questions of ethics, with the option to add their contact details.



FIGURE 11. Participants filling out cards at a ThingsCon salon in Copenhagen 2017

A couple of years later, in the spring of 2019, I had a chance to participate in a ThingsCon salon as a presenter rather than a co-organizer, sharing some preliminary insights and open questions springing from my PhD research. This salon took place in the Mozilla Berlin offices on May 6, and I was one of three presenters.<sup>4</sup> The theme of this salon was: 'Ethics and the Life Cycles of IoT':

>>> Doors open 6pm with drinks & time for mingling, programme kicks off at 6.30pm. Should you get lost, ping us on Twitter (@thingscon). We'll wrap up by around 8pm.<<< (ThingsCon 2019a).

<sup>&</sup>lt;sup>3</sup> We invited two presenters at the salon: Dr Lachlan Urquhart, who at the time was a research fellow in information technology law at the University of Nottingham, working between human computer interaction, technology law and digital ethics, and Kajsa Westman, a UX designer at Topp in Sweden with a background in industrial design at consultancies like frog design who works with user experiences in designing for the complexity of mixed physical and digital interactions. In addition to these two speakers VIRT-EU PI Irina Shklovski gave a talk and facilitated a discussion after the presentations.

<sup>&</sup>lt;sup>4</sup> Two presenters, who worked as a team, were Isabel Ordoñez and Chris Adams. In 2018 they hosted a workshop on designing out waste at a ThingsCon conference in Rotterdam that I return to in Chapter IV. As highlighted in the event description, they aimed to do some 'digging into some juicy issues of the circular economy and look at the life cycle from a material and industrial design point of view' (ThingsCon 2019a).

After having participated in various ThingsCon events over the course of more than two years it was time for a more interventionist engagement, where I had the chance to share some of my ongoing research with the founders of and participants in one of the communities that was part of my study. To put this another way, I actively participated in this field site, not only in the role of an observer, but as a presenter, sharing content and contributing to the 'tonality' of the discussions.

I had for the occasion prepared some cards with questions following on from the TechFest ThingsCon salon in Copenhagen. The cards were intended to help me explore a theme that was becoming increasingly apparent during fieldwork: that using ethics as a framework for discussing challenges in IoT development was starting to bring out a great deal of ambiguity within this community. How does one ask questions to address explicit ethics initiatives? Though it was difficult to find an ideal phrasing that would open a space for further reflection around the unease with emphasizing ethics in the context of IoT that I felt among various people involved with ThingsCon, the cards helped facilitate reflections about what some of the implications of promoting ethics in IoT might be, for better or worse. This is a topic I return to in Chapter V where I explore (dis)placements of responsibility for ethics and IoT.

In this research, ethics is an empirical object of study, a phenomenon within theory, and a matter constantly in play during the course of my PhD project. I have so far drawn the contours of the empirical phenomenon of ethics and IoT that I set out to analytically explore throughout the chapters of this dissertation. In the following part of this introduction I present a recent so-called 'ethical turn' in anthropology, along with the theoretical framework derived from STS that animates my analysis of the empirical enactments of ethics, which my three cases stand as examples of. Before doing so, however, I touch upon three ethical considerations in my research, even while emphasizing that questions about research ethics reach beyond these themes and permeate everything said in this dissertation.

#### Ethics

Firstly, my PhD research unfolded during a very particular period. The General Data Protection Regulation (GDPR), agreed upon by the European Parliament and Council in April 2016, replaced the Data Protection Directive 95/46/ec in the spring of 2018 as the primary law regulating how companies protect EU citizens' personal data (EU GDPR 2018). This means that the GDPR had been looming since the inception of this project and was launched about 18 months into it. The GDPR has brought with it a great deal of debate and uncertainty over questions about 'informed consent', 'processing' and 'storage' of qualitative data (Ibid.). In my research I was meticulous about making it transparent to participants in this project what their involvement entailed, and what the purpose and wider context of my PhD was. All recorded interviews with members of the Things-Con community were accompanied by a consent form providing these details, where participants could also indicate whether they wished to be anonymous or not. Though very

few expressed a wish to be anonymous, I have anonymized all interviewees to ensure coherence in my representation where it would be both confusing and ethically problematic to indicate and sort out anonymous voices from authentically named ones. Additionally, in case of doubt about any of these matters, I gave participants a chance to read through extracts of this dissertation and object to any content. There were no objections to implement.

Secondly, as already described, at least the first year of this PhD project was highly influenced by its involvement in VIRT-EU, along with visions about interdisciplinary collaboration and data sharing. In an experiment with a similar endeavor to conduct what my co-researchers and I refer to as 'ultra-short large-scale collective fieldwork' in the project Utopia, we shed light on the potentials that such an approach could enable (Blok et al. 2017). Given that a broader span of empirical sites can be visited at the same point in time, this kind of fieldwork allows for insights that a single set of eyes would be unable to catch (Ibid.). Nevertheless, in a book chapter where, together with two Utopia co-authors, I write more extensively about what it means to share field notes among several participants in a research project, we illuminate some of the ethical challenges in doing so (Fritsch et al. 2020). The chapter embraces both the difficulty of conveying a personal experience through the act of notetaking to someone who 'was not there', and the question of informed consent when research participants do not meet the researchers in a collaborative project who did not conduct the interview (Ibid.). In the context of VIRT-EU, the interdisciplinary character of the collaboration also sparked questions and uncertainties about what the different project teams could gain from shared field notes, as well as how to include this aspect in consent negotiations. As I return to in the fifth chapter of the dissertation, taking active part in a project funded by the EU brought with it some assumptions about ethics in the context of IoT development that called for respectful critical reflection.

Finally, while I have chosen to situate myself ethnographically in a position from which I can learn about ethics and IoT from a variety of interventions into IoT that are self-declaredly ethical, nevertheless, in my analysis of the empirical cases, I also attend to a point by anthropologist Tine Gammeltoft (2003). According to Gammeltoft, we are ethically committed to both loyally representing the experiences of our research subjects and to daring to move beyond these in our analysis (2003, 290). The aim of this thesis is not to find out what ethics inherently is or entails, but to explore the ways in which ethics is enacted when the concept is claimed through an analysis of various empirical cases. In my investigation, I therefore also move beyond what is explicitly stated in the ethical interventions into IoT that I analyze and point to dimensions of these ethical enactments of IoT that research participants would not have highlighted themselves. These are aspects that, in the comparative constellation of cases that this dissertation offers, open up spaces for critically illuminating and addressing how they each allow for different problems of IoT to emerge when they are influenced by their forms along with the agendas of their initiators.

## PART III

## Analytical Framework

#### A Turn Towards Ethics in Anthropology

During the past decade an 'ethical turn' has made its appearance in the field of anthropology. In this turn towards ethics a wave of scholars raise their voices (Faubion 2011; Zigon 2007; Laidlaw 2014; 2017; Lambek 2010; Mattingly 2012; Fassin 2014), while numerous anthropologists and their studies are more implicitly drawn into these debates. This dissertation contributes to these ongoing discussions about how we can approach and understand 'ethics' ethnographically through an engagement with central tensions and questions that invite further exploration. I now localize three themes that spring from the ethical turn and introduce matters at stake in ethnographic engagements with ethics mobilized in this PhD research. These include, firstly, a question about how to localize and approach ethics ethnographically; secondly, a discussion around ethics as 'ordinary everyday practices' versus manifestations of the ethical in moments of 'breaches' or 'breakdowns'; and thirdly, the relation between anthropology and a philosophy of ethics.

In my research I contribute to these themes in three main ways. Firstly, I bring forward initiatives that are explicitly framed as ethical in the context of technological development as a rich empirical point of departure into ethnographic studies of ethics calling for attention at this moment in time. Secondly, I shed light on how a rise in ethical interventions introduces ethics as not merely ordinary everyday practices, but as an occasionally extraordinary intervention responding to a travelling sense of unease about status quo, for instance in the context of IoT development. Thirdly, the dissertation questions whether ethical theory is the most fruitful analytical framework for understanding how ethics is enacted when explicitly claimed, as is the case in the ethical interventionist examples into the creation of IoT technologies in Europe that I analyze. Do we need ethical theory to analyze empirical instantiations of explicit claims to ethics? Or are they best understood through other analytical frameworks? As a fourth thread running through these three

contributions to scholarly discussions about ethics within the field of anthropology, I point to the importance of applying an analytical gaze that reaches beyond the human and highlights questions about materiality in studies of ethical interventions. I make this case inspired by STS studies that engage with questions about ethics and technology.

How is ethics approached in anthropology? In an edited volume that brings together anthropological studies under the heading of *Ordinary Ethics*, anthropologist Michael Lambek writes in the introduction that 'We do not begin with a definition of ethics itself' (2010, 6), emphasizing that he and other contributors use ethics and morality interchangeably, though 'with preference for ethics' (Ibid., 9). This echoes a piece written by anthropologist James Laidlaw on 'the ethical turn' where he declares that he uses the words ethics and morality interchangeably in the given context (2017, 1). In engagements with 'ethics, values and morality' within the growing field of 'the anthropology of technology', Douglas-Jones et al. point out that these concepts are often introduced together in intellectual discussions where distinctions are made between the nature of the respective concepts (forthcoming). Without engaging deeply with this theme, I acknowledge that ethics, values and morality are overlapping yet distinct concepts. As already articulated, this dissertation explores ethics and IoT through an analysis of empirical cases where this phenomenon is explicitly claimed in a variety of ways. But where and how have other anthropologists sought to localize ethics?

#### Theme I. How to Localize Ethics?

Anthropologists may justifiably ask 'what exactly is new' in the ethical turn, since they have been engaging with matters of morality and ethics all along (Zigon 2007; Laidlaw 2017). Yet, several scholars notice an absence of studies more explicitly attending to ethics which they link to a Durkheimian heritage (Zigon 2007; Lambek 2010; Fassin 2014; Laidlaw 2017), where 'morality is equated with society (or culture)' (Zigon 2007, 132). Consequently, anthropologists have been 'unable to distinguish the ethical from the entire realm of the social' (Lambek 2010, 12) making it 'quite difficult, if not impossible, to analytically separate a moral realm for study' (Zigon 2007, 132). This poses a risk of committing 'a category mistake' in scholarly attempts to localize a domain of ethics (Lambek 2010, 11).

As anthropologists begin to engage more explicitly with ethics many face a challenge of not merely localizing the ethical realm, but also of defining 'ethics'. In attempts to approach ethics both empirically and theoretically, questions about 'emic' or 'etic' and 'implicit' or 'explicit' articulate a difficulty of balancing proximity and distance in relation to ethics as an ethnographic phenomenon. As reflected in the words of Lambek: 'In writing about "ethics" as anthropologists we must be aware of whether we are simply adopting the natives' term and arguments [...] or attempting to take some distance from them' (Ibid., 8). Yet, attempts to take and maintain an analytical distance to ethics also entail a risk. This is critically addressed by anthropologist Jarrett Zigon, who points to how studies of morality at times convey 'the moral understanding of the social scientist [rather] than that of their subjects' (2007, 131). He adds that an anthropologist might frame practices as moral that 'local persons' would never describe as such (Ibid., 132). However, 'recently anthropologists have begun to study explicitly and analyze local concepts of morality' (Ibid., 131), Zigon notes with reference to Signe Howell (1997), Joel Robbins (2004) and Helle Rydstrøm (2003).

Questions about how to localize ethics ethnographically include considerations about implicitness and explicitness. Lambek suggests that ethics is to be found between the 'explicit' and the 'implicit' (2010, 28). With reference to Lambek's work on 'ordinary ethics', Laidlaw points out that some anthropologists believe 'ethics is immanent in human action' (2017, 7). He highlights his interpretation of Veena Das's (2010) argument that 'the ethical is therefore properly to be located in the ordinary or everyday' rather than in 'formalised, aspirational ethical projects: these are emphatically not where the ethical is to be sought' (Ibid., 7). This raises a critique of my PhD research. Yet, according to Laidlaw, approaching ethics as immanent comes with challenges of its own, as I mention earlier, namely a risk of normatively judging what is 'ordinary' or 'extraordinary' and thus foreclosing what the ethical embraces on a premature ethnographic basis (Ibid.).

Anthropologists thus face a challenge of localizing ethics. Confronting this in my own research, my questions became: if ethics is ubiquitous then where does one localize it in ethnographic engagements with the phenomenon? How can we navigate the balance between not imposing our own normatively preconceived understandings of ethics onto the phenomenon being studied while maintaining an analytical distance? As described, the proliferation of explicit claims to ethics in the context of IoT development became my empirical point of entry into the phenomenon. Below I move on to the next theme up for discussion in the ethical turn, which has to do with how ethics often manifests as an explicit object through 'breaches' or 'breakdowns'.

#### Theme II. Ethics as a Tactic to Deal with Breakdowns

Lambek writes that circumstances occasionally make ethics explicit, such as 'breaches' or encounters with 'ethical problems or issues in which the right thing to do is unknown or hotly contested' (2010, 2). In a similar vein, Zigon points to what he calls 'moral break-downs' as holding a particular promise for anthropological studies of ethics (2007, 133-134). Zigon addresses moral breakdowns through a distinction between ethics and moral-ity that otherwise seems to have attracted little attention in anthropological studies of ethics. While I do not attend too closely to questions about the distinction between morality and ethics in this dissertation, where the interventions into IoT that I analyze are explicitly framed as ethical, this distinction of Zigon's cuts the path to an analysis of the empirical material that I am working through, especially in Chapter IV.

In what Zigon calls the moral breakdown one is shaken 'out of the everydayness of being moral' (Ibid., 133); he considers a moral breakdown to be a 'moment in which ethics must be performed' (Ibid., 137). Following from this Zigon introduces 'a paradox

to ethics', adding: 'for when something becomes present-to-hand, that is, when something breaks down, it becomes disconnected from its usual relations in the world. It becomes an object' (Ibid., 138). He goes on to argue that it is on 'moments of moral breakdown that anthropologists should focus their methodological and analytic attention' (Ibid., 138).

As mentioned earlier in this introduction, Metcalf et al. (2019) connect an increasing investment in 'ethics owners' in the Silicon Valley tech industry to a list of scandalous cases in recent years. Metcalf et al. draw on the work of Zigon to emphasize that ethics is not merely an ordinary everyday practice, but that there are occasions where ethics is inseparable from needs to and calls for change (Ibid., 456). In similar vein, this dissertation points to a limitation in approaching enactments of ethics and IoT that I analyze as ethical practices carried out ordinarily. It does so through an illumination of how ethical interventions into IoT are sparked by a premonition, shared by many engaged with these emergent technologies across Europe, of inherent dangers in the development of IoT that facilitates extraordinary responses. As I illustrate, such responses – where ethics becomes an object – take different shapes in the context of IoT development and allow for different problems of IoT to emerge. This begs for a theoretical engagement with ethics that does not focus merely on individual actions, but also on material arrangements of ethics in different kinds of interventions into IoT.

#### Theme III: Anthropology and Philosophy

There is a big question running through anthropological engagements with ethics and morality as to what theories might shed light on these matters. Lambek suggests that while anthropologists draw on inspiration from philosophy, 'ethnographic encounter and an-thropological analysis might in turn enrich a philosophical understanding of ethics' (2010, 8). Thus, a dialogue takes place between anthropology and philosophy where an ethnographic particularity meets various philosophical strands of ethical theorizing.

An approach to ethics that has especially entered the field of anthropology is *virtue ethics* as introduced in the works of philosopher Michel Foucault (1986 [1984]) with inspiration from Aristotle (Faubion 2011; Mattingly 2012; Laidlaw 2017). According to Fassin, the publication of Alasdair MacIntyre's *After Virtue* (1981) sparked this comeback of virtue ethics rooted in Aristotle's thinking (Fassin 2014, 431). What is highlighted as valuable for ethnographic engagements with ethics is an emphasis on action rather than moral codes and prescriptions: 'returning to Aristotle, we can take ethics to be fundamentally a property or function of action rather than (only) of abstract reason' (Lambek 2010, 14).

During the course of my PhD research, I noticed a paradox that runs through many anthropological engagements with ethics, namely the aim to find a theoretical approach to studying ethics even while emphasizing the importance of ethnographic situatedness and contextualization. However, in empirical instances of ethics as an explicitly claimed phenomenon, is ethical theory what best facilitates our grasp of what is at stake? Is it a prerequisite that we draw on theories about ethics to analyze empirical ethical enactments? What have others done in their ethnographic engagements with ethics as an explicit object of study? What theories do they draw on, and what challenges do they encounter?

#### Three Analytical Approaches to Ethics as an Explicit Object of Study

Earlier in this introduction I presented three studies that engage ethnographically with explicit claims to ethics, namely 'Ethics Review Committees' of Asia and the Pacific (Douglas-Jones 2017), 'ethics owners' in the Silicon Valley tech industry (Metcalf et al. 2019), and 'data ethics' initiatives in the context of European policymaking (Hasselbalch 2019). While sharing an ethnographic commitment, scholars have approached ethics differently in their analyses of these studies. Metcalf et. al take their point of departure in the virtue ethical influence flourishing within anthropology to look at everyday practices ethnographically in studies of ethics, asking what ethics owners actually do instead of treating ethics as an abstraction (2019, 455). Hasselbalch, on the other hand, problematizes taking on a moral philosophical gaze altogether when inspecting data ethics initiatives as she localizes a challenge of attending to interests and power relations through this analytical lens (2019, 2). Hasselbalch instead argues that questions of data ethics must be approached from different disciplinary points of departure, where she is inspired by applied ethics, political science, sociology, culture and infrastructure/STS studies (Ibid.). Finally, Douglas-Jones, in an STS-inspired analysis of 'Ethics Review Committees', focuses on how spaces are made for ethical review 'politically, infrastructurally, materially' through various practices (2017, 13).

In my contribution to these ongoing ethnographic explorations of explicit claims to ethics as they manifest in different empirical examples and contexts, I draw on inspiration from each of these studies. Nevertheless, my research differs in the constellation of cases that this PhD dissertation sets out to compare and analyze. Like Metcalf et al. (2019), I approach ethics as a set of practices. Unlike them, I focus on the shapes that ethical enactments of IoT take, rather than on the everyday practices of developers that bring these emergent technologies into being. Like Hasselbalch (2019) I question whether analytical concepts derived from moral philosophy are best suited for articulating what is empirically at stake in European ethics initiatives in the context of rapid technological innovation. Unlike Hasselbalch, I am inspired by Douglas-Jones (2017) to focus on the material practices that bring different 'rooms for ethics' into being. However, I do so in a comparative study that sheds light on enactments of ethics and IoT across Europe, where not all these enactments spring from bureaucratic bodies, why they are rather different from international review boards. The focus on the materiality of ethics in the study by Douglas-Jones speaks to an attention in theoretical works on ethics and technology inspired by STS that I introduce briefly below before unfolding my analytical framework.

#### An STS Spin on the Ethical Turn

While reverberations of virtue ethics find their way into different disciplines, including scholarly work on ethics and technology (Metcalf et al. 2019, Ustek-Spilda et al. 2019), an STS twist on some challenges in a virtue ethical approach are of relevance to my study, as I now demonstrate. One of the philosophical works most prominently introducing the idea of virtue ethics in the field of technology is the book *Technology and the Virtues: A philosophical guide to a future worth wanting* (2016) by philosopher of technology Shannon Vallor. In this work, Vallor explores how the world becomes increasingly unpredictable with the introduction of emergent technologies, highlighting that IoT is 'shaping a future unparalleled in human history in its promise *and* its perils' (2016, 1). Vallor argues that our moral practices 'have always been intertwined with our technologies' (Ibid., 2) and believes that 'we need to cultivate in ourselves, collectively, a special kind of moral character, one that expresses what I will call the *technomoral virtues*' (Ibid., 1).

Maria Puig de la Bellacasa, working across STS, feminist theory and environmental humanities, points to a risk in the Aristotelian line of ethical theorizing that many contemporary virtue ethicists fall prey to: they reproduce a notion of how 'the ethical belongs to the level of individual morality' (2017, 132). Bellacasa argues that this is not straightforwardly the case. Bellacasa, as she raises this critique, suggests an approach to ethics that is inspired by STS and which allows for attending to societal and other than human aspects of technology (Ibid., 29). Bellacasa is a central source of theoretical inspiration in my analysis of how ethics and IoT is enacted through the Dowse box in Chapter III, and I return in more detail to her thinking shortly.

For now, what I wish to highlight is her critique of approaches to the ethical as belonging to the human individual, a problematization which is echoed in the thinking of philosopher Peter-Paul Verbeek. According to Verbeek, 'technologies and ethics have always had a complicated relationship' (2011, 3), and with reference to STS scholar Bruno Latour (1993) Verbeek problematizes treating ethics and technology as two separate spheres (2011, 6). In his thinking, inspired by both STS and postphenomenology, Verbeek argues that technologies participate in our ways of doing ethics (Ibid.1-2), and he does so with reference to Latour's (1999) famous example of how speed bumps affect our moral decisions when driving, as well as Madeleine Akrich's (1992) work on how morality is inscribed in technological artifacts. According to Verbeek, 'taking seriously the moral relevance of technological artifacts requires that ethical theory move beyond its classical assumption that morality necessarily is a solely human affair' (2011, 6), which echoes Bellacasa's concern about virtue ethics. In the context of technological development Verbeek finds it challenging that 'mainstream ethical theory, after all, does not leave much room for such a moral dimension of material objects' (Ibid., 2).

Following from Verbeek's inquiry into ethics and morality in the design of technologies, STS professor Sheila Jasanoff (2016) explores an entanglement of ethics, laws, responsibility and design, all dimensions that are at stake in technological development and which call for analysis and response, according to her. Jasanoff sheds light on how technological inventions 'raise ethical, legal, and social quandaries', asking where 'responsibility for risk' should be placed (Ibid., 7). In laws? In the design of technologies? Among their creators? (Ibid., 11;15).

STS-inspired scholars working through questions about ethics and technology shed light on the absence of attention to material dimensions in the context of technological creation and cohabitation. What the scholars I have just introduced all have in common is a conviction that focusing on how people work on cultivating themselves as virtuous beings is insufficient when it comes to what is ethically at stake in technological development. A virtue ethical approach does not direct our attention towards how material and more than human dimensions are central aspects of the ethical in technological realms.

While I am inspired by these studies, I approach the phenomenon of ethics slightly differently in my analysis of ethical interventions into IoT across Europe. The introduced scholars explore how technologies introduce new moral judgements (Akrich 1992), mediate morality (Verbeek 2011), or embed ethics (Jasanoff 2016). This poses questions about a delegation of ethics to nonhumans (Latour 1992) such as IoT connected technological artefacts with agentive capacities (Jørgensen 2016). Rather than exploring how ethics is embedded in IoT technologies or whether they have ethical agency, I explore how initiatives that ethically intervene in IoT themselves appear in different forms and are influenced by the agendas of their creators. I look at ethics as an explicitly declared empirical object calling for an analysis of its own. Below I introduce the analytical concepts that enable me to approach ethical enactments of IoT as such. If ethics in IoT becomes an object in moments of breakdown (Zigon 2007), then what kind of object does the phenomenon become? If we place the object of ethics and IoT at the center and, rather than looking solely into how individuals cultivate themselves as virtuous beings, focus on how they construct ethics as an explicit object to make ethical stakes in IoT known, then what do we see?

I have now drawn the contours of the main current debates in anthropology and beyond about how to approach the ethical ethnographically, along with STS-inspired discussions about ethics in the context of technological development. In the final section I present the concepts I use to analytically articulate my contribution.

#### Enactments of Ethics and IoT

In this dissertation I engage with questions about ethics in IoT from three empirical points of departure: writings, technologies and events. As I analyze these empirical instantiations of ethics and IoT I draw on concepts mainly inspired by STS scholars, *enactment* being the overarching conceptual framework that runs through all three versions of ethics as enacted in the context of IoT. To shed light on what characterizes the various enactments of ethics and IoT in each case, I draw on different subconcepts that I will also introduce.

With a point of departure in 'disease', ethnographer and philosopher Annemarie Mol makes an argument for approaching disease as something that 'is done in practice' (2002, 13). Mol introduces the concept of *enactment* to articulate this point: 'an ethnographer/praxiographer out to investigate diseases never isolates them from the practices in which they are, what one may call, *enacted*' (Ibid., 33). In the thinking of Mol, disease is thus approached as something that is inevitably immersed in practices and techniques that are part of making things knowable to us (Ibid.). Mol introduces the concept of *politics-of-what* to address how enactments of the same disease entail both different practices and ontologies: 'They *do* the body differently' (Ibid., 176). Mol thus argues that different enactments of reality co-exist (Ibid., 182) and entail: 'co-existing enactments of *the good*. Which goods are sought after, which bads fought? And in which ways are these goodnesses set up as being good?' (Ibid., 176). According to Mol analyzing the enactment of multiple realities sheds light on 'different ways of qualifying the good' (Ibid., 182).

In the ethnographic approach taken in this dissertation I seek, like Mol, to talk not just *about* ethics and IoT, but to talk *inside* the topic (Ibid.). I do this by analyzing how each case is a different enactment of the same phenomenon, in that each entails different aspirations, agendas and practices along with notions of 'the good' (Ibid., 182). Towards the end of her book Mol writes: 'even if it may be messy, practice is something else as well: it is complex' (Ibid., 182). This is my keyword for introducing an analytical concept that assists me in analyzing how ethics is enacted in writing by the IoT-EG.

#### Modes of Ordering and Acts of Holding Together

In the work carried out by the IoT-EG, complexity is a point of departure for the fact sheet on ethics and IoT intended to inform ongoing policy work (EC 2010a) which I will illuminate in Chapter II. Professor of geography Andrew Barry (2002) argues that attempts to engage with complexity in the context of technological development and European policymaking should not go unnoticed. With an empirical point of departure in the EC, Barry brings forward an overall claim about how: 'a concern with the complexity of science and technology has come to have some considerable political significance' (2002, 144). According to Barry, accounts of the complexity of science and technology in written reports tie into the whole European project, where they take part in 'an effort to reorder the world' and 'figure in efforts to develop policy that takes proper notice of complexity' (Ibid.). The ethical enactment of IoT in the IoT-EG case is situated in the context of European policymaking, which Barry's thinking assists me in illuminating.

Nevertheless, I also draw on the thinking of Mol and sociologist and science and technology scholar John Law, who explores how complexities are handled in knowledge practices. Focusing on written texts more specifically, they analyze what characterizes the ethical enactment that the IoT-EG fact sheet stands as an example of through their thinking about how processes of 'ordering' are an integral part of dealing with complexity in writing (Mol and Law 2002, 3). They describe how texts that carry stories 'tend to organize phenomena bewildering in their layered complexity into clean overviews' (Ibid.), entailing 'orderings' that impose silences in texts that inevitably simplify as they manage complexity in writing through 'acts of holding together' (Ibid., 7;10). Law and Mol relate critically to any notion of order in the singular (Ibid., 7), a point which combines the thinking from their respective research paths. Law argues that 'there is no such thing as "the social order" with a single center, or a single set of stable relations' (1992, 386). This opens up for how a social order is never complete (Ibid.). He invites us 'to instead think about 'orders, in the plural', and to investigate 'local processes' of 'ordering, and resistance' (Ibid.). Crosspollinating these thoughts with Mol's on enactment above, Law and Mol show how it requires deliberate efforts in texts to order and hold together 'multiple versions of reality' through 'coordination strategies' (Law and Mol 2002, 10).

The concept of 'ordering' in the thinking of Law and Mol, as well as Barry, enables me to articulate how ethics and IoT is enacted by the IoT-EG in a written document in the shape of a fact sheet seeking to order the complexity of IoT. This, as I will show, ties into Europe's position in the world order as an ethical pioneer. While the IoT-EG case stands as an example of a written enactment of ethics and IoT, the Dowse box, in a very different way, ethically intervenes into this phenomenon through its technological capacity to make visible the invisible. I will now introduce the second analytical concept that I draw on in my analysis of how ethics is enacted in the case of Dowse.

### Matters of Care

I now return in more detail to the thinking of Bellacasa touched on above. According to Bellacasa we live in an 'age of ethics' which 'is perceivable in an inflationist use of the word' (2017, 132). Bellacasa critically poses the question of 'whether ethics, as it is performed in different sites, reinforces rather than challenges established orders' (Ibid.). As mentioned earlier, she links matters of care to questions of ethics as she argues that ethicalities are involved in more than human relations of care (Ibid., 2). As I show in Chapter III, an important mission for the creators of the Dowse box in Dyne is to cultivate conditions for us to care about ethics in IoT by making visible the invisible operations of these technologies on our networks in an ethical intervention into IoT that takes the shape of a technology. How can one analytically approach care in a way that sheds light on the

practices of making visible the invisible as an ethical matter reaching beyond the human in the Dowse case?

Bellacasa assists me in examining what caring means in the Dowse case by introducing 'an ethics of care' (Ibid., 6) and by bringing our attention to 'inquiries into actualizations of care' (Ibid., 3). Bellacasa emphasizes that acts of care must be supported by material practices (Ibid., 4), which is why she relates critically to anthropocentric approaches to ethics (Ibid., 13). Bellacasa therefore calls for a displacement of 'traditional understandings of the ethical' that are focused on principles in contracts (Ibid., 22). Instead, she is interested in the material forces of ethics:

The 'ethics' in an ethics of care cannot be about a realm of normative moral obligations, but rather about thick, impure, involvement in a world where the question of how to care needs to be posed. That is, it makes of ethics a hands-on, ongoing process. (Ibid., 6)

Bellacasa here emphasizes that an ethics of care involves processes of relational re-creations asking of us to consider how to care. The question from Bellacasa of how to care as an inevitable part of ethics entailing a material involvement with the world assists me in analytically illuminating how the Dowse box seeks to create conditions for us to care about and respond to ethics in IoT as a material and sensory ethical intervention. Staying with this analytic thematic where the materiality of ethics is attended to, I will in the final section introduce my conceptual inspiration to shed light on what characterizes ThingsCon events as an ethical enactment of IoT.

#### The Materiality of Rooms for Ethics and Public Participation

In my analysis of enactments of ethics and IoT at events organized by the ThingsCon community, where numerous actors engaged with IoT gather to discuss these technologies – not least in the light of ethics (ThingsCon 2018) – I will draw mainly on two sources of thinking. Firstly, as mentioned earlier, I am inspired by Douglas-Jones's (2017) study of how material practices figure in attempts to make room for ethics. Secondly, I analytically mobilize the thinking of STS scholar Noortje Marres and anthropologist Javier Lezaun (2011) on the materiality of public participation. Douglas-Jones sheds light on how form and content fold into one another in deliberate efforts to create space for ethics (2017, 27), while Marres and Lezaun invite us to move beyond merely considering publics 'in discursive, linguistic or procedural terms' (2011, 490). Marres and Lezaun invite us to notice 'the role of materials and artifacts in the public organisation of collectives' (Ibid.) along with 'material settings that are carefully designed and arranged to produce particular effects' (Ibid., 495).

The chosen works addressing questions of carving out a space for ethics in designed settings and of participatory publics enable me to show how participants in ThingsCon events do not gather out of nowhere; rather, they come together in rooms that are carefully crafted to host conversations about ethics and IoT where form and content merge. This is a different gaze than one that looks merely at content and the discourses unfolding in the ThingsCon event spaces. The chosen analytical tools enable a move beyond regarding ethics and ethical interventions as practices of self-cultivation and direct our attention towards deliberate efforts to create space for ethics collectively and beyond the human. In the following I will outline the structure of this dissertation which takes its point of departure in the different empirical cases each providing a point of entry into the phenomenon of ethics and IoT.

#### Outline of the Dissertation

During the course of my PhD research I have encountered IoT technologies in numerous ways. In Chapter I, I invite you into a portfolio of my IoT encounters to get to know these technologies a bit better before looking into what three different ethical enactments of IoT look like. I enable an encounter with IoT technologies through an analytical weaving together of various threads in my writing – 'strings' that draw a 'figure' of IoT and enable us to 'stay with the trouble' of these technologies (Haraway 2016, 2), since it is this 'trouble' that lies at the heart of my analysis in the forthcoming chapters.

In Chapter II I analyze the first of three ethical interventions into IoT that this thesis sets out to explore, a piece of writing in the shape of a fact sheet on ethics and IoT which is the culmination of work carried out by the IoT-EG and its ethics subgroup between 2010-2012 (Van den Hoven 2013). My analysis shows how turning IoT and ethics into a written fact is not an easy task since the IoT-EG cannot agree upon what these emergent technologies even are why their very ontology is continuously up for debate (Latour 2004). Inspired by the thinking of Mol and Law (2002) and Barry (2002) my overall argument is that tackling this challenge through an ordering of ethics and IoT in writing ties into Europe's identity and geopolitical position in a global world order destabilized by the 2008 financial crisis and the advent of an increasingly digital economy. This dissertation as a whole looks into how *ethics* is rising across Europe in the wake of IoT development. I therefore reverse my analytical gaze in this chapter to look into how *Europe* is rising through ethics in IoT.

In Chapter III, I analyze a second enactment of IoT that is also square and white. It is, however, not a stack of papers as the fact sheet on ethics and IoT, but a technology: The Dowse Box. I argue that Dowse materially intervenes into a world increasingly populated by IoT connective devices through an enhancement of our sensorial apparatus that allows us to sense the pervasive presence of IoT that is otherwise imperceptible to us. Inspired by Bellacasa's (2017) thinking on care ethics I argue that this box seeks to cultivate conditions for caring about a more than human world increasingly populated by IoT

connected things. It does so through the act of making visible invisible IoT operations on our networks, enhancing our ability to respond to ethical matters at stake in IoT.

In Chapter IV I analyze a third enactment of ethics and IoT that is rather different from a document and a box, namely a string of events in the shape of salons and conferences organized by the ThingsCon community. At these events numerous people, prototypes and IoT technologies come together to discuss things attending to the ethical questions they pose in light of their increasing connectivity. Inspired by the thinking of Zigon (2007) I illuminate how a sense of ethical unease moves participants to act on ethics and IoT by attending these events. However, my overall argument is that these gatherings around things across Europe do not just appear out of nowhere. Inspired by the thinking of Douglas-Jones (2017) and Marres and Lezaun (2011) I argue that ethical interventions into IoT in the shape of ThingsCon events are carefully designed material settings crafted to facilitate collective reflections on ethics and IoT. Eventful spaces are extraordinary and temporary why this analysis contributes to ongoing discussions in the anthropological turn towards ethics and its focus on ordinariness.

In the fifth and final chapter I initiate a comparative dialogue across all empirical instantiations of the ethical in IoT. Different claims to ethics come with different allocations of responsibility: Who is supposed to act on ethics and IoT? Who is responsible? As numerous paradoxes in the empirical examples illuminate, placing the responsibility for taking care of ethics in IoT is not straightforward. My analysis shows how (dis)placements of responsibility are continuously mobilized in paradoxical ways both within each of the three different empirical interventions into ethics and IoT as well as across them in a comparative constellation.

Finally, my conclusion recapitulates the main arguments of the dissertation along with its main contributions while pointing to avenues for further research. I furthermore reflect upon the potential of critique through comparative studies of ethical interventions into emergent technologies such as IoT, but also AI, VR or others. I argue that the form of a given ethical enactment matters for what can be ethically addressed. In a time where claims to ethics in technological development are proliferating it becomes important to notice what problems different ethical enactments of emergent technologies bring to the surface as well as paying attention to those they delegate to the background.

# CHAPTER I

## Encountering the Internet of Things



FIGURE 12. A prototyping board – Torino Mini Maker Faire 2017

I am standing face to face with a 'board' in my hand. It is 20.39 on May 27 2017, about five months into my PhD project, and I am attending a *Mini Maker Faire* taking place in an industrial building of Torino where 'makers' – engineers, artists, scientists, crafters, technologists and more – meet to experiment with new technological developments (TMMF n.d.). The board is dark blue, and was placed in my hand by a participant responding to a question of mine about what an IoT technology actually consists of and how one creates novel IoT inventions. I am told that perhaps not this particular board, but an entity similar to it, could be one among several components that might take part in prototyping and creating IoT technologies. Through my encounter with the board, I therefore learn that even though IoT technologies often appear to be bounded objects, the things of IoT connective devices contain, in effect, numerous technological elements across hardware and software.

This is the first time I have touched *a fragment* of an IoT technology that can reveal what actually goes into the different IoT creations that I have come across at large IoT expos in various European cities. Just a couple of weeks before my participation in the Torino Mini Maker Faire, in Lyon at SIDO, 'Europe's leading IoT, AI, Robotics and XR event', I encountered a piece of clothing called *Data Collector*.



FIGURE 13. Data Collector at SIDO – Lyon April 2017

Data Collector is an IoT invention in the shape of a piece of clothing created by 'Cité du design' and 'RANDOM(lab)' (ESADSE 2016). This connected 'hoodie' has the capacity to sense and capture data about the environments that the person wearing it passes through, which can then be shared via one's smartphone. It can measure the 'quality' of our surroundings and send warning notifications in case of 'danger' (Ibid.). Its ability to do so rests on a composition of multiple technologies such as *sensors*, though these are not visible to us at first sight, when mainly what we see is a coherent piece of clothes. In this chapter I explore what exactly IoT technologies are. This, as I think my reader will begin to realize as I share chosen moments from my journey of IoT encounters, is not as straightforward as it sounds.

Throughout the process of conducting my PhD research I encountered IoT technologies in numerous ways. My encounters embrace actual IoT creations, various IoT components, innumerable conversations *about* IoT, literature *on* IoT, virtual reality (VR) experiments with inhabiting the world *as* IoT and discussions in public media, to name a few examples. In this chapter, I invite you into a portfolio of my IoT encounters to get to know these technologies a bit better before looking into what three different ethical enactments of IoT look like. I enable an encounter with IoT technologies through an analytical weaving together of various threads in my writing – 'strings' that draw a 'figure' of IoT and enable us to 'stay with the trouble' of these technologies (Haraway 2016, 2), since it is this 'trouble' that lies at the heart of my analysis in the forthcoming chapters. Stretching

the image of IoT as a figure, anthropologist Lucy Suchman introduces the concept of *configuration* to shed light on how a broad range of practices and discourses fold into technological artifacts (2012, 48). Their form might differ depending on a given configuration of the technology in question, because technological artifacts reach beyond their physical components (Ibid.). Configurations are never all-encompassing, since they bring forward some aspects while leaving out others (Ibid.). As I create a space for encountering IoT technologies more closely in the following sections, I draw a multidimensional figure of these technologies in relation to my research topic by presenting themes shared across current publications about IoT and the empirical cases that I analyze where these themes are turned into ethical matters.

Firstly, I illuminate how the *things* of IoT are made up of multiple components, making them difficult to both confine and define. This is a central challenge for scholars of IoT, including those involved in the IoT-EG convened by the EC, which was tasked with writing a document on ethics and IoT, more particularly a written piece in the shape of a 'fact sheet' that would 'stand as a point of reference for the policy work now underway' (EC 2010a). The IoT-EG struggles to decide what the concept of IoT entails, and if they cannot even agree upon what IoT is, then how will they go about turning ethics and IoT into a written fact sheet?

Secondly, I explore the visions animating the creation of IoT technologies traced by various scholars to strands of computational development including physical computing (McEwen and Cassimally 2014, 1), pervasive computing (Baldini et al. 2018, 907; Rose 2014, 10), tangible computing (Kerasidou 2019, 99) and ubiquitous computing (ubicomp) (Sharma et al. 2019; McEwen and Cassimally 2014; Rose 2014; Tzafestas 2018; Jørgensen 2016; Grönvall et al. 2016; Gabrys 2016). IoT's ties to ubicomp in particular are pointed to continually in scholarly engagements with IoT, a visionary field of computing introduced by Mark Weiser (1991), who articulates novel aspirations about and agendas for technological development. Technological development is often accompanied by design virtues (Inman and Ribes 2019, 1), and several scholars across STS, design and human-computer interaction (HCI) shed light on how IoT technologies realize ubicomp visions about the disappearance of computers and the invisibility of technologies seamlessly inhabiting our surroundings (Grönvall et al. 2016; Gabrys 2016; Jørgensen 2016; Kerasidou 2019; Inman and Ribes 2019). In this part of the chapter, I show how design virtues of disappearance, seamlessness and invisibility lie at the heart of ubicomp. However, as my analysis of ethical interventions into IoT will illuminate, these design virtues, ironically, turn out to be ethically problematic across all empirical cases when realized in actual IoT inventions. This is especially evident in the ethical enactment of IoT that the Dowse Box, created by Dyne, illustrates via its mission to make visible what has been made invisible in IoT.

Thirdly, before moving into an analysis of the respective empirical cases, I bring them together to convey how they all participate in a broader movement of concern about our future with IoT technologies across Europe, where the ThingsCon community is a locus point for the three ethical enactments of IoT that I analyze. I do so to place the empirical cases in a broader context of ethical echoes travelling across European borders before moving on to compare the characteristics of each enactment of ethics in IoT. The chapter ends with a few questions that prepares the ground for my analysis of the three ethical enactments into IoT that I analyze in this dissertation: are we facing a crossroads for moving in either a dystopian or utopian IoT future? And is this where ethics thrives?

But first, before moving into these three themes, I unfold the analytical inspiration that informs how I approach 'things' in order to open up for IoT technologies in a way that allows me to articulate just how many different dimensions come together in these connected artifacts and the ethical questions they pose. This insight feeds centrally into a challenge that many actors initiating ethical interventions into IoT face across the board, providing a foundation for my forthcoming analysis.

#### THINGS



FIGURE 14. 'Blue City' - the venue of a ThingsCon event Rotterdam 2018 (ThingsCon 2018b)

THINGS – the word hangs in the air in yellow capital letters before participants at the ThingsCon conference show up to gather around this phenomenon in the context of IoT for two days in December 2018 in Rotterdam's 'Blue City'. The slide begs the question: What even is a 'thing' in the context of IoT?

That the 'things' of IoT are not coherently bounded objects confined by their physical borders is evident at this ThingsCon event, where a diverse group of actors have come together to address and explore IoT, raising a range of topics in keynotes, plenaries and workshops while actual experiments with IoT creation simultaneously take place. At the ThingsCon conference in Rotterdam 2018, unfolding about a year and a half after my encounter with the board in my hand at the Mini Maker Faire in Torino, I come across an example of other boards in action in a setup that is more contextual. These boards take part in an experiment where ThingsCon participants seek to create a prototype of connected cups and glasses (just imagine if the bartender could for instance be notified *before* your glass is fully empty).



FIGURE 15. Connected drinks at a ThingsCon event Rotterdam 2018 (ThingsCon 2018c)

This example conveys in more technological detail how IoT technologies, even though they might look like *one* thing – a drink, a lamp, a teddy bear – in practice entail numerous components in conjunction. The example of the prototype above additionally illustrates how actual IoT inventions take part in ThingsCon events. However, when participants publicly gather around 'THINGS', the phenomenon bringing them together is equally about visions, values, uncertainty, laws and politics in a space designed to discuss what

it means to do 'ethical' and 'responsible' IoT in the 21st century (ThingsCon 2018). So how can we think about things in a way that enables analysis of IoT technologies and the ethical matters they pose?

Across anthropology, STS and design, scholars increasingly approach 'things' from different methodological and theoretical points of entry. In anthropology scholars propose that we should methodologically follow things (Krøijer and Sjørslev 2018) or conceptually think through things (Henare et al. 2007, Holbraad and Pedersen 2017). In STS, Bruno Latour (2005) suggests that we invite other than humans more centrally into our parliamentary processes. Latour argues that: 'We perhaps never differ about opinions, but rather always about things — about what world we inhabit' (2004, 455). As the very ontology of things is up for controversy and negotiation according to Latour, we can never take for granted that we agree on any thing (Ibid.). Lorraine Daston sheds light on the multiplicity of artifacts describing how 'the thingness of the thing lies in its power to "gather" other elements to it' (2008, 16). These gatherings in technological objects according to Madeleine Akrich embrace heterogeneous 'forces', 'scripts', and 'decisions made by designers' (1992, 205;207-208). This thinking has found its way from STS into the field of design, where inspiration in relation to conceptualizing and approaching 'design things' anew is drawn from Latour and Gilles Deleuze and Félix Guattari's (1980) philosophy on assemblages (Jenkins 2015; Bjögvinsson et al. 2012; Binder et al. 2011; Wiltse 2020; Robbins 2020). For instance, Bjögvinsson et. al. state that 'a fundamental challenge for designers and the design community is to move from designing "things" (objects) to designing Things (socio-material assemblies)' (2012, 102), introducing the idea of things as more than the sum of their technological components.

This approach to things stretches into research on IoT more specifically when STSinspired historian Finn Arne Jørgensen writes that 'the Things of the Internet of Things are never just things; they are assemblages of issues and controversies, entangling and connecting values, interests, and actors, never in isolation from the rest of society' (2016, 48). This thinking about things invites a realization that it is not just a range of technologies folding into the artifacts of IoT; so, too, do a diversity of values, visions, issues, controversies, actors, and societal agendas. This is expressed in the three empirical enactments of ethics and IoT that I analyze in this dissertation. As my analysis points to, it is difficult to ethically encapsulate these technologies when very few agree about what IoT creations actually are.

Jørgensen, for instance, articulates how the concept of IoT entails at least two overarching dimensions when he writes that since its coining, IoT has 'gained traction as a way of both describing and prescribing the frictionless and technologically connected world' (Ibid., 42). Elaborating on this statement, he suggests that the term IoT refers to both 'the interconnectedness of technological artifacts through sensors and communication networks' and to 'a set of design fictions about how these artifacts are changing the world' (Ibid.). Jørgensen here emphasizes that technical aspects of IoT inventions cannot be separated from visions animating the design of these connected things with a capacity to alter our technological habitat (Ibid.).

As the perspectives just introduced reveal, I have not only encountered IoT during fieldwork, but also through literature that springs from various disciplinary fields. Scholars heterogeneously articulate what is at stake in IoT, such as Jørgensen's argument about how the concept of IoT encompasses at least two overarching dimensions (Ibid., 42). The variety of voices brought forward in this chapter have animated my thinking about IoT technologies in the course of this research and show from just how many different points of entry we can enter this phenomenon. This diversity also characterizes the ethical interventions into IoT that I analyze in this dissertation, which address the matter very differently in terms of both form and content. Before moving into a section exemplifying in a bit more detail what IoT technologies consist of, I outline three encounters with IoT literature that paint pictures of these emerging technologies in words. In my ongoing dialogue with ethnographic insights, these books have armed me with knowledge about IoT and influenced my technological imagination at different moments during my PhD research.

#### A Brave New World of IoT

On your way out of the house, you catch a glow in the corner of your eye. Your umbrella handle is lit up, which means that it has checked the BBC weather reports and predicts rain. You sigh and pick it up. (McEwen and Cassimally 2014, 8)

In this IoT scenario from the book *Designing the Internet of Things* (2014) by technological entrepreneur Adrian McEwen and software developer Hakim Cassimally, a thing in the shape of an umbrella is turned into an IoT connective device capable of communicating to you through light that rain is on its way. This was my first literary encounter with IoT. It was when I was in the process of applying for this PhD project, and still trying to understand what an IoT technology design process looked like since my initial research aim was to explore how ethics was practiced by IoT creators in the development of these technologies. While I read the book by McEwen and Cassimally, I could not help but be fascinated with all the potentials of IoT technologies. Nevertheless, during my fieldwork, which exposed me to all the ethical uncertainties proliferating across Europe, I felt an increasing sense of skepticism towards the development of IoT that colored my thinking about these technologies.

A few years later, when I had just rounded off my fieldwork and worked through the empirical material at my ethnographic disposal in New York on a research stay abroad, I was serendipitously given a book by the host of an event marking the transition from 2019 to 2020 as soon as I mentioned the topic of my PhD project. The book, *Enchanted Objects: Innovation, Design, and the Future of Technology* (2014), authored by entrepreneur

and MIT Media Lab lecturer David Rose, destabilized my thinking at this moment. This study made it evident to me that dystopian scenarios of IoT are not merely about the advent of these technologies, as my co-authored analysis of manifestos had illuminated (Fritsch et al. 2018). Dystopian imaginaries could equally count for a world *without IoT*. While an object such as an umbrella in the vision by McEwen and Cassimally (2014) is turned into an actively communicative actant among us, Rose presents an IoT scenario which stands in juxtaposition to visions about a future where artifacts step more actively into our lives. Rather, Rose envisions how things might altogether disappear as a consequence of computational and technological development. In the following quotation a world without IoT is imagined:

I have a recurring nightmare. It is years into the future. All the wonderful everyday objects we once treasured have disappeared, gobbled up by an unstoppable interface: a slim slab of black glass. (2014, 1)

Rose brings forward the enchanting talents of IoT technologies as constitutive of their innovative potential, placing a great potential in connected artifacts to fend off his nightmare about the development of computing:

I want the future of our relationship with digital technology to look less like the cold slab of glass of my nightmare and more like my grandfather's basement workshop – chock-full of beloved tools and artifacts imbued with stories. I want the computer-human interface to be an empowering and positive experience. (Ibid., 3)

According to Rose, screens do not 'take advantage of the computational resources' and 'they don't improve our relationship with computing', leaving us with devices that 'are passive, without personality' (Ibid., 21). Scenarios about IoT and the capacity of things like umbrellas to participate more actively in our lives therefore, in the thinking of Rose, encompass a vision about computational development. To Rose, a world pervaded by screens is framed as decidedly a nightmare, while a world inhabited by active artifacts is desirable and enchanting.

A third piece of writing, which I encountered more recently, is authored by technology writer Samuel Greengard in a book titled simply *The Internet of Things* (2015) published as part of the MIT Essential Knowledge Series. I came across this book because of an insistent sensation towards the end of my PhD project that I had still not properly understood what IoT technologies were – a somewhat unsatisfactory feeling given how many years of my life I had dedicated to exploring them. Accordingly, I actively searched for a source of knowledge that would provide a sort of definitional anchor, while paradoxically simultaneously both acknowledging and analytically insisting that IoT technologies are not one thing. Yet, I somehow still felt an illusionary longing for introducing the readers

of this dissertation to what IoT is with more clarity. Would it not be comforting and clarifying to actually know *what* the technologies that this dissertation is about *are*?

Echoing the visions above about the capacities and change-generating forces of IoT technologies Greengard, rather than keeping IoT scenarios in a futuristic tense, starts his narration from a point where the development of IoT has 'already moved far beyond science fiction' (2015, 123). A long-envisioned reality full of connected devices is 'now unfolding before our eyes', Greengard writes, describing IoT technologies as a 'shock wave' while emphasizing that 'it's just getting started' (Ibid., xii). That we are only witnessing the beginning of what technologies are capable of is reflected in the quotation below:

Make no mistake, we are entering a brave new world of immersive and embedded technology. It's a world that, at first glance, may seem much more like science fiction than science fact. But it is fact [...] It's as if the rules of earthly physics have been rewritten on the fly. (Ibid., xiii-xiv)

According to Greengard IoT technologies have the capacity to change 'earthly physics'. He similarly to Rose situates IoT in the context of computational development as he attributes to these technologies the power to spark a digital revolution that continues 'the widespread adoption of computers in the 1970s and 1980s' (Ibid., xiv-xv). Greengard thus sheds light on how IoT technologies enter a history of technological breakthroughs that all lead to radical transformations in society, affecting everything from political and social domains to practicalities in our everyday lives (Ibid., xii; xv). If you ask Greengard: 'It's not a question of whether the IoT will take place, it's a matter of how exactly it will happen and how much it will change the world' (Ibid., xviii). This reflects an ethos of 'technological determinism' (Jasanoff 2016; Bowles 2018), which the enactments of eth-ics and IoT that currently echo across Europe challenge. I return to this point in the final part of the chapter, where I show how these ethical interventions into IoT create a cross-roads for our future with IoT technologies.

I have just shared three encounters with IoT in books that contribute to a growing body of literature about IoT spanning several professions and scholarly fields. Along with presenting visionary potentials of IoT and how these technologies might alter our world, many of these literary engagements take a moment to reflect upon the ethical questions they raise. In a final chapter of their book, McEwen and Cassimally argue that, as with any technology, IoT-connected artifacts are ethically ambiguous (2014, 289). This perspective is echoed by Greengard, yet not explicitly in the language of ethics, as he states: 'Clearly, IoT will be used in both good and bad ways' (2015, 137), adding that 'the potential gains won't come without a good deal of pain – and plenty of unintended consequences' (Ibid., xv). Greengard here addresses an uncertainty about our technological futures that these technologies bring about, something I return to towards the end of this chapter.

All three books situate IoT technologies in a longer history of computing where ubicomp does not go unmentioned. But before looking into how ubicomp as a field has influenced the advent of IoT connective devices and the computational virtues that these technologies embed, I offer a definitional encounter with IoT encompassing a brief survey of some of the attempts to define what these technologies are in the existing literature.

#### **Definitional IoT Encounters**

As already revealed, while acknowledging that there is no single definition of IoT, I have paradoxically continued seeking for one, feeling a need for a definitional fixpoint describing and delimiting the phenomenon that I am studying as it is ethically enacted. What I have learned through my search for a definition of IoT is that many others share this challenge across all the fields that I have ethnographically immersed myself in. Many researchers into IoT point out how Kevin Ashton, the cofounder and former executive director of the MIT Auto-ID Center, coined the term Internet of Things in 1999 (Greengard 2015; Rose 2014; Tzafestas 2018; Sharma et al. 2019; Jørgensen 2016, Gabrys 2016), including Ashton himself. In an article called *That 'Internet of Things' Thing*, Ashton writes that: 'I could be wrong, but I'm fairly sure the phrase "Internet of Things" started as the title of a presentation I made at Procter and Gamble (P&G) in 1999' (Ashton 2009).

That I am not the only one feeling a need to define IoT is evident when reading through other written pieces dedicated to exploring these technologies. In their book on designing the IoT, McEwen and Cassimally begin by saying that an obvious question they 'should attempt to answer is, of course, what is the Internet of Things?' (2014, 7). However, they hasten to point out that there is no straightforward answer since 'people have many different visions of what the phrase means, and many of the implications are hard to grasp' (Ibid.). Pursuing a similar mission of definitionally approaching IoT, Greengard dedicates a whole section in his book to *Defining the Terms, Understanding the Concept* (2015, 15). While acknowledging just how many distinctions and nuances there are in various definitions of IoT, Greengard nevertheless decides to present an overall definition of IoT: 'By now it should be clear that the Internet of Things quite literally means "things" or objects that connect to the Internet – and each other' (Ibid.).

McEwen and Cassimally, tackling the challenge of defining IoT, introduce a definitional IoT equation that, like Greengard's, highlights the presence of various components in these technologies: 'Physical Object + Controllers, Sensors and Actuators + Internet = Internet of Things' (2014, 11). Another definition of IoT that emphasizes the multiple technological components that these technologies embed is suggested by Fritz Allhoff and Adam Henschke. From a scholarly point of departure spanning philosophy and technology, they conclude: 'The IoT refers to a complex network of interactive and technical components clustered around three key elements: sensors, informational processors, and actuators' (Allhoff and Henschke 2018, 55).

Jørgensen also brings up the challenge of defining IoT, observing that 'there is no clear and unanimous definition of the term' (2016, 43). Yet, rather than seeking to nail down a definition of IoT through a constellation of words that brings together the technological components of these technologies, Jørgensen instead suggests that we 'think of it as an umbrella term covering a series of emerging practices and standards' (Ibid.). This definitional take on IoT, where the influence from STS shines through, resonates with my approach to ethical enactments of the phenomenon in this dissertation. I could perhaps, therefore, have stopped my search for a definition of IoT post my encounter with Jørgensen's conceptualization.

Yet, I kept searching for a more tangible definition of IoT, an anchor that I could hold onto in the ever-moving analytical waters I was immersed in. My search led me to a chapter on 'The History, Present and Future with IoT' (Sharma et al. 2019) authored by scholars from the fields of data and computer science. In no other literary source on IoT had the challenge of defining these technologies been addressed more explicitly. Sharma et al. quickly conclude that 'there is no definition of Internet of Things which is universally accepted', bringing forward how multiple IoT definitions circulate and have done so during the past decade (Ibid., 31). Sharma et al. introduce us to this comparative idiom:

The concept is almost the story of 'The Blind Men and [the] Elephant', it depends on the way we perceive and conceive the lucrative power of IoT. Different researchers, scientists define the term in their own way, some focus more on objects, devices, Internet Protocols and Internet, while others focus on the communication processes involved. (Ibid.)

Sharma et al. here bring forward how different researchers have various interests in IoT that color their definitions, referring to a parable from India where a group of blind men seek to understand what an elephant is: 'each touching a different part, and disagreeing on their findings' (Baldwin n.d.). While Sharma et al. do not provide a clear definition of IoT, they describe these technologies as: 'constellations of objects, things, devices, technology, protocols' (2019, 32).

Latour et al. in an argument about how 'the whole is always *smaller* than its parts' (2012, 591) bring forward the concept of *monads* derived from a social theory by Gabriel Tardes (Ibid., 600). Echoing the story of the blind men and the elephant above, Latour et al. claim '*there is no whole superior to the parts*' (Ibid.). A monad is 'a *point of view* on all other entities' (Ibid., 598), and if we want to learn about what an entity 'is' we must do so 'through other entities' that take part in its composition (Ibid., 600). Any point of view on an entity thus depends on the place from which one enters it (Ibid., 598) and, as the empirical examples and definitions that I have introduced so far in this chapter show, IoT
technologies encompass innumerable entities, making for equally uncountable entry points into them.

The above attempts to define IoT illustrate how definitional difficulties are rooted in the multiplicity of these technologies, as well as the many kinds of expertise engaged with IoT. The diversity of the definitions highlights the varying aspects of their composition – sensors, actuators, the Internet, things, practices, standards, informational processors, protocols – and reflects the range of interests in the phenomenon. This is echoed in diverse ethical enactments of IoT across Europe, where the challenges of defining IoT technologies appear to have implications for how ethics is grasped; or rather, why ethics seems ungraspable. This theme is particularly evident in the work of the IoT-EG, commissioned by the EC in 2010 to provide a 'written contribution' in the shape of a fact sheet on ethics and IoT that will inform ongoing policy work (EC 2010a), as stated in the online register of Commission expert groups. If it is not possible to define and delineate IoT, then how will the group go about turning IoT and ethics into a fact in writing? My analysis in the next chapter takes its point of departure in this question. However, it is a question that also ties into the IoT encounter that I describe below. This encounter brings us back to the photo at the start of this chapter that illustrates that IoT connected artifacts are, in fact, many things.

In the following section I take a closer look at the multiple technologies making up an IoT connective device, indicating how each component in the constitution of an IoT technology has a whole history of multiple technological developments folded into it. What does the realization of IoT look like technologically? What is so novel about these technologies? And what novelties are cause for ethical concern?

#### **Technological IoT Encounters**

Other than a piece of clothing such as the *Data Collector*, or a prototype of connected beverages, what kinds of IoT inventions are out there? Having encountered everything from smart hairbrushes to connected diapers, from food-sensing containers to biometric scanners, from intelligent toasters to interactive lamps during this research project, I am tempted to say that pretty much only your imagination sets the limit.

Across *environmental*, *health* and *insurance* sectors, for instance, you find a variety of IoT connective devices. An example of an IoT technology actively entering our habitats is flying insect microrobots such as *RoboBees*, which can aid in environmental monitoring as we face challenges of climate change and crop pollination (Wyss Institute at Harvard n.d.). RoboBees are tiny robots – about the size of half a paper clip – that can both fly and swim underwater. A RoboBee consists of this physical body with wings able to flap because of 'piezoelectric actuators' while also being equipped with 'sensors and control electronics that mimic the eyes and antennae of a bee', making them able to sense

and respond dynamically to the environment (Ibid.). In the health sector we find the *ADAMM* asthma monitor, a small triangular device worn under the clothes that monitors asthma symptoms to detect potential attacks (ADAMM 2020). The device catches information about cough and respiration patterns, among other factors that influence asthmatics (Ibid.). This data can then be transferred via Bluetooth to a smartphone while algorithms 'develop a picture of what's unique to you'. You can then share the data with others, for instance healthcare providers, and receive notifications (HCO n.d.).

As the examples above illustrate, a central quality of IoT technologies is tied to their capacity to gather and process data, as explicitly expressed in the name *Data Collector*. In the insurance sector, this ability sparks speculation about what role IoT technologies will play when 'companies assess, price and limit risks' (Deloitte n.d.), since 'data has always been at the heart of the insurance industry' (Marr 2021). IoT is expected to hold great potential for the pricing of insurance and rating models, not least because of the 'predictive analytics' that IoT technologies enable (Embroker 2021), – a rather prominent ethical concern among several IoT practitioners I spoke to during fieldwork. But what enables things among us to generate data?

As descriptions of the Data Collector, RoboBees or ADAMM indicate, IoT connective devices embed a combination of technologies across hardware and software. This is exemplified in the presented cases where physical artifacts can detect information via sensors and respond through actuators while also sharing data on various connected platforms. Things turned into IoT technologies embrace multiple technological components such as Wi-Fi, Bluetooth, 3G, 4G, satellites, radio frequency identification (RFID), nearfield communication (NFC), sensors and GPS, to name a few. A range of technological inventions both pave the way for and feed into IoT technologies where each technological component has a historical trajectory. According to Greengard, it is exactly such a configuration of many different technology feeds into the other, and together, a far more powerful and expansive platform is born. It's something akin to a 1+1=3 equation' (2015, 36). According to Greengard we are dealing with exponentially evolving technologies in the context of IoT where each connected thing has more than one technology folded into it.

Sharma et al. place IoT technologies in a league with, yet above, other inventions with revolutionary potential such as the steam engine, printing press and electricity: 'It is predicted that IoT will rival all the past scientific marvels [...] and will surpass all the previous industrial revolutions' (2019, 28). Still, they simultaneously emphasize that existing technologies support the evolution of IoT: 'The first idea of IoT appeared almost two decades ago, but the technologies behind it had already existed and were under development since many years' (Ibid., 32). Various scholars seek to draw the contours of some key historical landmarks of relevance and importance for the realization of IoT technologies (McEwen and Cassimally 2014; Rose 2014; Greengard 2015; Tzafestas 2018; Sharma et al. 2019). These include the introduction of 'RFID' in 1973 or the

development of 'sensor nodes' in the 1990s (Sharma et al. 2019, 33), the era in which the 'Internet' and 'the idea of a globally connected planet' really began to take hold (Greengard 2019, xii). In addition to the technological components feeding into IoT technologies, endeavors to create connected devices started to appear in the 1980s, an example of this being how a 'coke machine was connected to [the] internet to report the availability and temperature of the drink' in 1984 (Sharma et al. 2019, 33).

The technological multiplicity of IoT technologies is not conceptualized merely in written words, but also through visual illustrations conveying what they are composed of. Innumerable visualizations of IoT technologies flourish online where different building blocks of IoT solutions are depicted. In one visualization, for instance, IoT technologies are depicted as entailing five 'layers': device *hardware* and *software* along with channels of *communications* as well as *cloud platforms* and *applications* (Elizalde n.d.). Additional visualizations provide further granulation of these layers as you can find a stack detailing each of them.

Latour introduces the concept of articulation, exemplified through a case of how noses are trained in the perfume industry to distinguish variations in fragrances (2004a, 2-3). Latour describes how pupils at first are 'inarticulate' and unable to detect what he refers to as 'layers of differences' in odors (Ibid., 5). Through training sessions, they learn to articulate not merely the sharp contrasts in fragrances, but also the smaller ones (Ibid., 3). The thinking of Latour sheds light on how I came to see IoT technologies differently as my research progressed, from encountering them as coherent artifacts to approaching them as heterogenous constellations. As I encountered IoT technologies anew - at large expos, as separate technological components, through narrations from informants about the ethical matters that IoT brings about - I was often confronted with my inability to articulate. Yet, I have also cultivated an increasing capacity to notice 'fragrances' and 'layers of difference' (Ibid., 5). For instance, during a Sensemakers Meetup in Amsterdam that I attended on March 23 2018, I got to know about different networks for IoT such as LTE-M, LoRa, Sigfox, and NB-IoT. In propositions for what kind of network is ideal for IoT, ethicalities manifested through discussions in this meetup about velocity, energy consumption and the number of messages one can send, along with the security of their arrival and the risk of data being lost in transition.

What does the multidimensional technological composition of IoT have to do with ethics? As an IoT developer once explained shortly after I initiated my PhD project, since numerous kinds of technologies, options and choices are involved in the creation of any IoT technology, the development chain becomes so complex that no one person really has the expertise to think it through from end to end. Each time a technology overlaps with another technology, or one kind of expertise overlaps with another, you basically have what he conceptualized as a 'risky gap'; for instance, numerous combinations of a particular

network in dialogue with specific kinds of sensors or actuators pose different ethical challenges.

One technological component is emphasized by many as playing an important role for the novel potential of IoT technologies and the computational visions they embody, namely sensors: 'the eyes, ears, nose, and fingers of the IoT [...] essentially the magic that allows the IoT to work' (Greengard 2015, 121). Jennifer Gabrys, chair in media, culture and environment at the University of Cambridge, links the presence of sensors to the realization of Weiser's visions for ubicomp to make 'computing an invisible force that runs through the background of everyday life' (2016, 6). In the words of Gabrys, Weiser 'imagined this would take place through networked and computationally enabled sensors' (Ibid., 6) because they hold a potential to 'traverse hardware and software' (Ibid., 4). In their research into ethical issues at stake in IoT, Daniela Popescul and Mircea Georgescu emphasize that – of all the components and technologies making up an IoTconnected device – sensors in particular 'play a very important role in establishing the relationship between the virtual world and the parameters of the physical world' (2013, 209). This ability characterizes these technologies and the ethical stakes they raise, as I show when I return to this topic in the final section of this chapter.

Moving my focus to Jørgensen's point about how IoT technologies embed both technologies and visions (2016, 42), I turn to the composition of IoT technologies to explore how technological visions for our future feed into IoT connective devices. In addition to inscribing themselves in a history of technological developments, IoT technologies reach into different fields of computing, laying out visions for technological futures such as ubicomp introduced by Gabrys just above. This means that discussions around ethics in IoT tie into not merely a longer history of technological development, but also visionary imaginaries for the future with the virtues accompanying these. Jørgensen argues that 'to properly understand the Internet of Things, we need to look at its storytellers, the ones selling the idea of the connected future' (2016, 46), suggesting that IoT 'can be seen as the latest iteration of [the] ubiquitous computing vision, a new take on an old future' (Ibid.). In the following section, I shed light on how ubicomp visions and the design virtues linked to them are included in the historical trajectory of IoT technologies by several scholars (Tzafestas 2018; Sharma et al. 2019; McEwen and Cassimally 2014; Rose 2014; Jørgensen 2016; Grönvall et al. 2016; Gabrys 2016). Next, I illustrate how they turn out to be ambiguous when realized through IoT technologies, as the ethical interventions into IoT that we currently see across Europe express.

#### **Visionary IoT Encounters**

As Rose's (2014) nightmare about artifacts disappearing in favor of screens indicates, anticipations tied to the advent of IoT connective devices are not merely about playfully imagining what a technological pollination of things can contribute in 'smart ways'. They

are also carried by incentives to avoid certain futures caused by technological developments that one does not wish to inhabit, such as the ones pervaded by screens. Virtues are always at stake in technological development (Vallor 2016), and in the design of new technologies (Inman and Ribes 2019). This counts for a world inhabited by IoT connective devices, and scholars either inspired by or moving across the fields of STS, design and HCI recently point to how IoT technologies are a realization of ubicomp ideals in practice (Grönvall et al. 2016; Gabrys 2016; Jørgensen 2016; Kerasidou 2019; Inman and Ribes 2019). While a search for literature about IoT has led me in the direction of very different authors engaging with this phenomenon, looking into the theme of ubicomp and IoT is more confined to the scholarly fields that my research is in academic dialogue with. Within HCI, design and STS, an interest in a subtheme addressing questions of *disappearance*, *visibility* and *invisibility* has emerged, a cluster of themes lying at the heart of ubicomp visions and manifesting in ethically loaded ways throughout the empirical material engaging with IoT development that I am working through.

That a similar concern to Rose's regarding computing and the disappearance of things as a consequence of an increase in the number of screens is at the very core of ubicomp is clearly reflected in the title of a piece written by Weiser called *The World is not a Desktop* (1994). Taking a point of departure in feminist STS, Xaroula Kerasidou sets out to explore the futuristic narratives at the heart of ubicomp (2019, 101). In her analysis of the narrative springing from and surrounding ubicomp Kerasidou, like Rose, localizes computation 'as the force that will breathe life into a mundane and passive world' (Ibid., 107). To support this point she presents us with the following quotation: 'As technology becomes hidden within these static, unintelligent objects, they will become subjects, active and intelligent actors in our environment' (Marzano 2003, 8–9 in Kerasidou 2019, 107-108). Kerasidou examines how computation is presented in the narratives of ubicomp as being able to 'travel unobstructed through any medium, our everyday objects and our environment' as a 'powerful, almost magical, entity' (2019, 108), echoing Rose's imaginaries about the enchanting capacities of interactive artifacts (2014, 5).

In these thoughts we see how the development of computing in the visions of ubicomp seems to, somewhat ironically, entail the very disappearance of computers, and that this imaginary can be realized in practice by coupling computation with artifacts that we are already surrounded by in our everyday lives, reanimating them. Jørgensen directly brings up the relation between IoT technologies and ubicomp, describing how Ashton, in formulating his ideas about IoT, 'built upon an older set of visions about ubiquitous computing' (2016, 43). Gabrys also makes a direct link, pointing out how a 'growing wave of interest in sensors and ubiquitous computing has occurred on either side of Weiser's proposal', using Ashton's introduction of IoT in 1999 as an example (2016, 6). One cluster of themes lying at the heart of ubicomp manifests in particularly ethically loaded ways throughout the ethical interventions into IoT across Europe that I analyze, namely *disappearance*, *visibility* and *invisibility*, a topic I introduce below in a bit more detail.

In the visions of ubicomp, the development of computing involves the disappearance of computers by integrating them into things. Sarah Inman and David Ribes (2019) examine how the values of seamlessness and invisibility inspired by ubicomp have been central across the scholarly fields of ubicomp, HCI, CSCW and STS, in a paradigmatic move in design towards pushing computers into the background of our lives. In such visions of making technology invisible – not least for its users – seamlessness became a value to aspire towards, they write. Following from this, they indicate the ways in which these design virtues can become problematic, suggesting that any designer must ask: 'what specific kind of backgrounding has occurred, and what kind of interaction may be of use revealing it?' (Ibid., 10).

That invisibility is key to the creation and realization of Weiser's visions for ubicomp becomes clear when reading his various publications. For instance, he writes: 'It was the desire to build technology truer to the possibility of invisibility that caused me to initiate the ubiquitous computing work at PARC five years ago' (Weiser 1993 in Kerasidou 2019, 102). As pointed to by Erik Grönvall et al. in the field of design, the development of ubicomp visions in practice involves an increase in the numbers of wireless devices inhabiting our environments even though these remain 'largely invisible to us' (2016, 829). Grönvall et al. here introduce a paradox where we are surrounded by more and still somehow less computing in our lives because regular artifacts are pollinated with invisible computational capacities. As Gabrys puts it: 'Rather than the well-known trope of engagement that involves making the invisible visible, Weiser advocated for further invisibility' (2016, 6). The vision of disappearance and invisibility in ubicomp is not envisioned as a radical change, but rather a subtle transformation, as reflected below by Kerasidou:

The computational power that will fill our lives, according to ubiquitous computing, will not be alienating, complex, obtrusive, or even noticeable for that matter, and again we come full circle to ubiquitous computing's goal of invisibility. It will be invisible, as its advocates envision, it will leave no traces and bring no radical changes. (2019, 108)

But how are ubicomp visions realized in practice and what is the role of IoT in all of this? According to Kerasidou, 'physical interfaces through which the physical and virtual worlds can be bridged' (2019, 102) hold importance in contemporary computer research about 'how we can make computers disappear' (Ibid.) or how to get the computer 'out of the way' (Ibid., 103). A seamless integration of computation into the world across hardware and software has since the beginning of ubicomp been a central aim of technology development (Ibid., 99). In her endeavor to unravel how the ubiquity of computing will be realized Kerasidou emphasizes how the combination of various components such as hardware and software, wires, radio waves and more is a central component of realizing the ubiquity mission and vision in practice (Ibid.), a description that resonates with the technological multiplicity of IoT.

Jørgensen similarly considers how a ubicomp future implemented by Ashton entails 'bridging the world of physical things with the Internet' (2016, 43) where IoT technologies blur 'the boundaries between what counts as a computer and what does not' (Ibid., 48). Invisibility as an ideal in computing involves aspects of technologies themselves becoming invisible as well as their capacity to access invisible realms. In the visions of ubicomp, computation melts seamlessly into the background of our everyday existence, which is realized in IoT through the integration of computers into things.

The realization of these visions in the shape of IoT technologies, nevertheless, seems not merely to highlight the capacity of these technological creations to be invisible themselves, but also to tie into their capacity to access the invisible. Picking up on a point by Ashton (2009) about how it is somewhat challenging for people to gather data Greengaard describes that: 'The IoT can dive into the nooks, crannies, gaps, and wormholes that exist in an imperceptible and often invisible world that extends far beyond human eyes, ears, smell, and consciousness' (2015, 21). Or as Gabrys puts it, 'networked environmental sensors make it possible to listen in on a planet that has always been "talking to us," but which we can only now begin to hear' (2016, 7).

In this part of the chapter my aim has been to bring to light some of the visionary motivations behind IoT technologies by presenting how researchers across scholarly fields emphasize a connection between the visions for ubicomp and the realization of those visions in IoT connective devices. Design virtues accompanying the disappearance and (in)visibility of computing in our lives hold promises, which in turn are laid out in ubicomp visions such as reanimating artifacts, saving us from screens and desktops, and enabling access to invisible worlds.

Nevertheless, a range of ethical challenges spring from these ubicomp ideals once they are made manifest in the 'things' of IoT, cutting across the empirical cases that I analyze in this dissertation. I explore this in more depth in Chapter III, where I analyze how the Dowse box as an ethical intervention seeks to make visible what has been made invisible, calling for us to return our attention to the pervasive role of computing in our lives. But first, I briefly address how the bridging of the physical and the digital leads us into uncharted ethical waters. According to Jørgensen, the technological bridge across physical things and the internet (2016, 48) alters our computational interactions, and this has profound implications for ethics when it comes to technologies with agentive capacities (Ibid., 49).

Ubicomp visions of a technological constellation that crosses physical and virtual realms, making computers disappear by integrating them into things, is a topic that poses novel ethical questions. I turn there now in the final section of this chapter.

#### Uncharted Ethical Waters and Our Futures with IoT

Jørgensen makes the point that the concept of IoT embeds both technical aspects and futuristic design fictions (2016, 42), and it is exactly this bridging of the physical and the virtual lying at the heart of ubicomp visions that has implications for ethics (Ibid., 49). This is a perspective that reverberates in current research into ethics and IoT technologies across the scholarly fields presented in the introduction. To put this another way, it is this novel characteristic of IoT technologies that moves us into uncharted ethical waters (Ebersold and Glass 2016; Popescul and Georgescu 2013; Baldini et al. 2018).

In their article on why IoT is a cause for ethical concern in information systems, Kyle Ebersold and Richard Glass emphasize the linking of the physical and the virtual through these objects (2016, 145). As already indicated above, Popescul and Georgescu, investigating a range of ethical issues in IoT in an article spanning the fields of economics and public administration, highlight how IoT brings with it 'a world in which the borderline between the physical and virtual life is becoming more and more difficult to draw' (2013, 208). In similar vein, in their paper on ethical design in IoT within the field of science and engineering ethics, Gianmarco Baldini et al. present two definitions of IoT technologies where both point to an increased integration of 'digital' and 'real' worlds, a synthesis that characterizes the pervasiveness of IoT (2018, 906-907).

An anticipation that the ethical stakes of IoT will rise when IoT extends 'the Internet from its current configuration into the physical world', as Jørgensen puts it (2016, 45), runs through these studies, and the ethical enactments of IoT that I analyze in this dissertation. As I discuss later, it is written centrally into the IoT-EG's fact sheet on ethics and IoT that, since these technologies can impact our physical surroundings, they bring in ethical matters beyond those introduced by the internet (Van den Hoven 2013, 11). Dyne similarly exemplifies this consideration in a presentation of the Dowse box: 'Imagine devices having open flames (your barbecue) [...] that can be activated remotely. Does it sound like a safe home of the future?' (Dowse n.d.*a*).

The expectation that the ethical issues at stake in IoT are more severe than those present in traditional internet services echoes a point by anthropologist Tom Boellstorff about how the 'physical' is often assumed to be more 'real' than the 'virtual' (2016, 387). That IoT technologies can cause more severe harm than traditional internet services because of their capacity to affect our physical surroundings reflects this assumption in the context of ethics and IoT. Boellstorff brings our attention to how the opposition between the 'physical' and the 'virtual', or the 'real' and the 'digital', is ontologically challenging since a world in which everything physical is considered real appears to simultaneously decline the reality of the digital (Ibid.). In IoT, ethical matters appear to sit at the intersection of this distinction and exemplify why a hard line between the two is not easy to draw. It may also explain some of the challenges in efforts to articulate ethics and IoT. To sum up, IoT technologies pose ethical questions sparked by a novel technological constellation that cuts across hardware and software, raising moral ambiguities in the ubicomp ideals of disappearance, seamlessness and invisibility in technological development manifesting in ethical interventions into IoT.

So far in this chapter I have outlined how the definitional and technological multiplicity of IoT provides a foundation for understanding the challenge that the IoT-EG faces in its commissioned task to write a fact sheet on ethics and IoT, and how the visions of ubicomp contextualize the ethical intervention into IoT that the Dowse box illustrates by making visible the invisible. In this last part of the chapter, I paint a picture of the uncertainty about our futures with IoT that gives rise to the ethical interventions into IoT that currently proliferate across Europe. This leads us back to the THINGS assembly hosted by the ThingsCon community in Rotterdam in 2018, one among several ThingsCon events that provide a space for discussing all things pertaining to IoT, not least questions about ethics and responsibility. A space where members of the IoT-EG, Dyne and other participants gather and talk through all the questions that IoT technologies raise and their respective ways of ethically intervening into the phenomenon.

In ubicomp research, anthropologist Genevieve Bell and professor of informatics Paul Dourish describe how ubicomp as a field of computing has always been rather unusual in that it is characterized by its visions of future technological possibilities rather than being defined by technological problems (2007, 133). This is indicated in the futuristic title of the foundational ubicomp article by the founder of the field *The Computer for the 21st Century* (Weiser, 1991). Nonetheless, the manifestation of ubicomp visions in the shape of IoT introduces quite a few problematic aspects of the world imagined in ubicomp. In the words of Bell and Dourish: 'The ubicomp world was meant to be clean and orderly; it turns out instead to be a messy one' (2007, 142). As my co-authors and I illuminate in our analysis of IoT manifestos (Fritsch et al. 2018), these documents are often sparked by broken promises of modernity (Lyon 1999), and their theme that the ubicomp world has turned out to be a messy one is an insight that resonates across the three empirical cases I analyze in this dissertation. Looking into the numerous current ethical interventions into IoT and the problems they address, it is fair to say that the ubicomp future may 'not have worked out as the field collectively imagined' (Bell and Dourish 2007, 133).

In the context of IoT development the positively anticipated design virtues of technological invisibility have not turned out to bring with them a smoothly connected world in a time where technological breaches allow for access to private data from a teddy bear (Samuels 2017) or spam emails from a connected fridge (McOwan and McCallum 2017), as indicated in the introduction. While IoT technologies melt seamlessly into our environments as ordinary things that are integrated into infrastructures, thus operating as an invisible background in our everyday lives (Edwards 2003, 191), when infrastructural breakdowns occur, issues manifest and questions arise (Bijker and Law 1992). As mentioned in the introduction, anthropologist Michael Lambek directs our attention towards how ethics is often 'turned explicit' exactly through 'breaches' where we are confronted with 'ethical problems or issues in which the right thing to do is unknown or hotly contested' (2010, 2). Because it is still an emergent technology, a lot is inevitably uncertain about IoT and the ethical matters it introduces (Allhoff and Henschke 2018). Echoing Bell and Dourish's point about how ubicomp is driven by possibilities rather than problems (2007, 133), Jørgensen highlights how:

The Internet of Things, as many other design fictions, is often accompanied by technological boosterism as well as considerable enthusiasm from its creators, but generally doesn't attempt to pry into the more problematic implications of a connected world. (2016, 47)

Jørgensen, noticing an enthusiasm expressed by the creators of IoT technologies, shares an invitation to think through 'which problem such connectedness aims to solve, and for whom' (Ibid.). However, the ethical interventions into IoT currently proliferating across Europe illustrate that the enthusiasm their creators feel for IoT technologies are far from unmixed. Rather, they express deep uncertainty about what kind of IoT future they are taking part in building. Rather than ignoring the problems posed by an increasingly connected world, many involved in the development of IoT technologies are raising their voices and sharing concerns that travel across European borders through manifestos, critical technologies and events.

The enactments of ethics that I analyze in this dissertation insist that we stay with the trouble of IoT (Haraway, 2016), and the challenges of these technologies that might otherwise drown in the 'hype and hope for the future' characterizing sociotechnical imaginaries of digitalization (Hockenhull and Cohn 2021, 302). In the growing body of IoT manifestos, calls to pay attention to the hype around IoT are explicit. A manifesto author, for instance, depicts the advent of IoT technologies as 'a very hyped "technological revolution" (De Roeck, RIOT 2017), while the creators of the Dowse box state that 'the IoT hype' about 'things that will be allowed to connect to the Internet and talk to other things [...] requires attention' (Dyne n.d.c). In the IoT Design Manifesto (2015) the hype around IoT does not merely require attention; it also calls for skepticism: 'We don't believe the hype. We pledge to be skeptical of the cult of the new'. Thus, the creators of IoT want to cut through the hype around it because it clouds the problematic aspects of these new technologies, including the new ethical challenges they expose us to (Fritsch et al. 2018).

Manifestos create publics for debate (Parent 2001), as does the ThingsCon community through events in European cities, as I analyze in chapter IV. At ThingsCon events like the conference in Rotterdam in 2018, where the word THINGS in capital letters awaited the entry of participants as they gathered around the IoT phenomenon, IoT manifesto authors who are skeptical of IoT hype meet with many others to discuss issues at stake in

IoT development. That we are facing a crossroads for our common future with IoT technologies is clearly expressed in the call for participation that frames the 2018 ThingsCon conference, where the organizers first describe how the IoT is 'maturing' before adding that they have 'climbed the peaks of inflated expectations' (ThingsCon 2018). They go on to lay out some promising and positive developments in IoT before plunging into how a 'darker, more concerning narrative of surveillance capitalism, weak security, and privacy lures in the clefts' (Ibid.).

As much as authors of IoT manifestos (Fritsch et al. 2018) and the ThingsCon community paint pictures of the dystopian futures we could be moving towards with IoT technologies, they simultaneously emphasize that it is not too late to change the course of events and alter the direction in which IoT development is currently steered. This message echoes across Europe in the enactments of ethics and IoT that this dissertation analytically brings together. This insistence on a technological future that is not yet set challenges any assumptions about a future that is already technologically determined (Jasanoff 2016; Bowles 2018). As the ethical interventions into IoT that we currently see across Europe carve out territories for ethics, they create a collective crossroads for our future with IoT technologies. Enactments of ethics and IoT appear to spring from this crossing point of possible futures, an intersection where utopian and dystopian narratives about and experiences of IoT meet. As stated by several IoT manifesto authors, we are in this IoT mess of possibilities and dangers together, and the choices 'we' make now have implications for our IoT futures (Fritsch et al. 2018).

Highlighted here is an open-endedness in our technological futures, something addressed by several scholars more broadly (Brey 2012; Jasanoff 2016; Jørgensen 2016; Bowles 2018; Schiølin 2019). As Jørgensen puts it with reference to Steven J. Jackson's (2014) work across information science and STS on 'rethinking repair', we must consider what kind of world we are moving towards with the advent of IoT and its visions of a frictionless future. Jackson asks: 'Is it the imaginary nineteenth-century world of progress and advance, novelty and invention, open frontiers of development?' (Jackson 2014, 221 in Jørgensen 2016, 50). Or is it 'the twenty-first-century world of risk and uncertainty, growth and decay, and fragmentation, dissolution, and breakdown?' (Ibid.).

This reflects a 'dialectics of pessimism and optimism' at stake in technological futures, to put it in the words of STS scholar Kasper Schiølin (2019), or an intersection of both the perils and promises at stake in our technological futures and the ethics of invention as explored by STS scholar Sheila Jasanoff (2016). Jasanoff brings up how information and communication technologies (ICTs) 'have opened up new frontiers of hope' (Ibid.). She continues: 'Indeed, technology and optimism fit together like hand in glove because both play upon open and unwritten futures, promising release from present ills' (Ibid.). After introducing this point, Jasanoff critically examines some of the problems 'offsetting invention's alluring promises' (Ibid.). Jasanoff asks: 'Is there a middle ground for responsible, ethical technological progress between unbridled enthusiasm and anachronistic Luddism?' (Ibid., 16).

In this question Jasanoff brings together the concepts of 'ethical' and 'responsible' in her thinking about our futures with technological inventions, a point I return to in chapter V. I do not aim to answer this question of Jasanoff's in my research, but to highlight our common ground: the point she makes is that the ethical interventions into IoT across Europe that I analyze embed opposing forces of excitement and concern, and that humanity is right now standing at a crossroads where different technological futures are possible. As with other emergent technologies (Brey 2012; Jasanoff 2016; Bowles 2018), since IoT technologies are still immature in terms of their development, many point to how a lot about our future with IoT is still unknown; there are many unpredictable dimensions to tackle. It is exactly in this tangled landscape of promises and potential dangers of IoT connective devices that a range of actors involved with the development of these technologies across Europe operate. All participants in my PhD research are claiming this moment as a point in time where ethical interventions into IoT development might alter the course of events as we stand at a crossroads where a potentially dystopian future with IoT can be fended off. This belief and motivation brings together the three enactments of ethics and IoT that I analyze separately in the forthcoming three chapters before bringing them together in a comparative constellation at the end of this dissertation.

## Conclusion

In this chapter I have invited you into a portfolio of my IoT encounters so that you may get to know these technologies a bit better before embarking with me on my analytical unraveling of the three ethical interventions into IoT. I aimed to enable an encounter with IoT technologies through a weaving together of written 'strings' that analytically drew a 'figure' of IoT (Haraway 2016; Suchman 2012), conveying the trouble that these technologies pose in light of the ethical themes they raise. Across the current publications and empirical cases I analyze in the forthcoming chapters, the common thread is the ethical matters at stake in IoT.

Firstly, I asked the question: What is a thing in the context of IoT? This led me to illuminate how the *things* of IoT are made up of multiple components reaching beyond the physicality of technological artifacts, where they are not easily either confined or defined. This is a central challenge for scholars researching IoT, including the IoT-EG convened by the EC to write a document on ethics and IoT in the shape of a fact sheet, as I explore in the following chapter.

Secondly, I aimed to illustrate how IoT technologies are not made up of multiple technological components alone, but also incorporate ubicomp visions about the disappearance of computers in favor of invisible technologies that seamlessly inhabit our surroundings. As I have shown, ubicomp is appointed a central role in the creation of IoT technologies by several scholars across STS, design and HCI. This encounter with IoT provides a foundation for understanding how ubicomp design virtues of *disappearance*, *seamlessness* and *invisibility*, when realized in actual IoT inventions, raise ethical concerns shared across all empirical cases in this dissertation. This is especially evident in the ethical enactment of IoT seen in the Dowse Box, which makes visible what IoT made invisible.

Thirdly, before moving into an analysis of the respective empirical cases, I have brought them together to convey how they all participate in a broader movement of uncertainty about our future with IoT technologies across Europe, where the ThingsCon community is a locus point for the three ethical enactments of IoT that I analyze. I have done so to contextualize the empirical cases in a broader context of ethical echoes across European borders before moving on to compare the characteristics of each enactment of ethics and IoT. This chapter ends with a series of questions that prepare the ground for my analysis of the three ethical enactments of IoT: are we facing a crossroads for moving into either a utopian or dystopian IoT future? If so, do ethical interventions into IoT spring from this intersection of possible futures? And if they do, how do they allow for different problems of IoT to emerge? With these questions in mind tying the three empirical cases together, I now set about analyzing some of the different ways that ethics and IoT can be enacted.

# CHAPTER II

## Factualizing Ethics

Although there is a general agreement of what IoT entails in a broad sense, not unlike other emerging ICTs, much of its concepts are still much debated. This lack of conceptual clarity makes it difficult to analyze IoT from an ethical perspective (Van den Hoven 2013, 2).

This opening quote is from a document in the shape of a so-called 'fact sheet' about ethics and IoT entitled *Fact sheet - Ethics Subgroup IoT - Version 4.0*. This piece of writing is the culmination of a two year process of work carried out by an expert group on IoT (IoT-EG) convened by the European Commission (EC) in 2010. Over the course of 10 meetings running from 2010 to 2012, the IoT-EG discussed everything from questions about the definition of what IoT is, to how ethics in IoT can be a potential answer to rebooting a European economy following the 2007-2008 financial crisis.

Professor of ethics and technology Jeroen van den Hoven, Chair of a subgroup in the IoT-EG on ethics, stands as the author of the fact sheet (Van den Hoven 2013). Yet in a footnote on the very first page of the document we learn that several experts in the IoT-EG and seven other members from the ethics subgroup have contributed to this piece of writing authored in the voice of 'we' (Ibid.). This is to be kept in mind every time I quote and refer to this publication that counts 21 pages and is written with the overarching aim 'to present and to explore [...] what are the "ethical issues" arising from the research, development and deployment of IoT' (Ibid., 4). However, as the opening quote indicates, while being entitled a 'fact sheet,' this piece of writing is far from a factual document as it sets out to do so responding to a threefold *mission* of the IoT-EG articulated by the EC addressing the challenges of IoT on a European level, 2) Create 'written contributions', and finally, 3) Participate in 'a shared vision for the development and deployment of the Internet of Things in the framework of the Digital Agenda for Europe, a flagship of the Europe 2020 Strategy' (EC 2010a).

This fact sheet containing both the words 'ethics' and 'IoT' in its title thus has a commissioned *purpose* and *form*: a written contribution with advice on IoT challenges in the context of an agenda and a strategy for Europe, both launched just a few months before the IoT-EG began its work (EC 2010). In this chapter I analyze this empirical example of a self-declared ethical intervention into IoT in the shape of a document. What characterizes a written version of ethics and IoT? What kinds of practices are part of

creating the document, and what problems of IoT emerge through this form? What interests and negotiations are tied into this ethical intervention in IoT? The quote opening up this chapter introduces a central theme of my forthcoming analysis sparked by the questions it makes me pose. Why is it difficult 'to analyze IoT from an ethical perspective' due to 'a lack of conceptual clarity' (Van den Hoven 2013, 2)? And how is this challenge tackled in an enactment of ethics and IoT in a written genre that presents itself as fact?

As the IoT-EG responds to its task defined by the EC, this gathering of experts face quite a few difficulties in its work on ethics and IoT. This chapter is organized around three thematic challenges and has five overall sections. In the first two sections I introduce the IoT-EG in more detail along with a presentation of theories that inspire my analysis in a qualitative coding of the fact sheet on ethics and IoT as well as minutes from ten meetings preceding its existence. In the third section I analyze a challenge within the IoT-EG to define the phenomenon of IoT as conveyed in the previous chapter. In conjunction with how diverse kinds of expertise are part of the IoT-EG, this makes for innumerous variations of IoT conceptualizations. How can the IoT-EG then address the topic of ethics when nobody can agree on what IoT even is? The problem of defining IoT brings with it difficulties of grasping ethics. This opens up for a fourth section where I look into how the IoT-EG goes about tackling these challenges in the commissioned form: a written contribution. I show how the fact sheet is itself a particular arrangement of ethics and IoT, a process of ordering that ties into the whole European project. In the fifth and final section, I show how the IoT-EG's focus on ethics in IoT takes part in a geopolitical agenda of formatting and situating Europe as an ethical pioneer, introducing ethics in a political economy. At the point in time when the IoT-EG convened, the European economy was challenged by the influence of the financial crisis 2007-2008. This ties into the EC's framing of the IoT-EG's work positioned in the context of respectively the European 2020 Strategy and A Digital Agenda for Europe (EC 2010a), two initiatives that deal with how to move out of the financial crisis.

My analysis illuminates how the IoT-EG's work on ethics and IoT, while responding to and entailing many challenges, also hold promises for the whole European project, not least for Europe's geopolitical position in a global market of technological innovation. This dissertation as a whole looks into how *ethics* is rising across Europe in the wake of IoT development. I therefore reverse my analytical gaze in this chapter to look into how *Europe* is rising through ethics in IoT.

## Ethical Expertise – Any Volunteers?

Where did the IoT ethics fact sheet come from and why was it written? Through the EC's *Register of Commission Experts Groups* (2010a), we learn that its origins are in a so-

called *Creating Act* that took place on August 10th 2010. The EC made a decision about setting up the expert group on IoT (E02514) posed the *Task* to 'assist the Commission in the preparation of legislative proposals and policy initiatives' (Ibid.). At the time, the Digital Agenda for Europe had just been launched in May 2010 'to chart a course to maximise the social and economic potential of ICT' (EC 2010, 3). This Digital Agenda for Europe was published just a few months after the introduction of a Europe 2020 Strategy in March 2010 where the EC engaged with how to 'exit the crisis and prepare the EU economy for the challenges of the next decade' (Ibid.). This objective reverberates in the Digital Agenda for Europe with an aim 'to get Europe back on track' through a digital economy where ICT play a central role:

The crisis has wiped out years of economic and social progress and exposed structural weaknesses in Europe's economy. Europe's primary goal today must be to get Europe back on track (Ibid.).

As a 'horizontal initiative,' the Digital Agenda for Europe 'makes proposals for actions that need to be taken urgently' (Ibid.). A visualization in this document entitled *Virtuous cycle of the digital economy* presents three dimensions of growth and seven problem areas (Ibid., 4-6). The bringing together of the European economy and an innovative potential of ICT in the light of virtuousness echoes in the IoT-EG's work on ethics and IoT which I will look into in section four of this chapter. For now, I wish to contextually illuminate the work of the IoT-EG framed as a contribution to a shared vision for IoT in light of this European agenda (EC 2010a).

The parameters of how the IoT expert group would work and who should take part were defined by the EC. Following documentation subsequently uploaded to the EC's electronic portal, an interested citizen such as myself can see in an Activity Report that the group met 10 times between September 2010-November 2012 (Ibid.). We also learn that the IoT-EG works within the Policy Area of 'Information Society,' how the Type of the group is Formal and Temporary, and that the Scope of the group is 'limited' (Ibid.). In a short summary, we gain insights into how the IoT-EG during the two year process where it operated localized a range of challenges tied to IoT technologies, and that six thematic subgroups were created. Each subgroup has offered a fact sheet towards the end of the two year process, such as the one on ethics, with five additional fact sheets on Identification, Privacy and Security, IoT Architectures, Standards; and IoT Governance (Ibid.). Describing the purpose of the fact sheets on the IoT-EG online portal, the EC describes how 'these documents will stand as a point of reference for the policy work now underway' (Ibid.). In the very first pages of the IoT-EG fact sheet on ethics and IoT, it is also explicitly presented that the document responds to a mission of the IoT-EG framed by the EC to point out policy objectives and policy recommendations (Van den Hoven 2013, 2). This situates the IoT ethics fact sheet in a context of European policymaking.

My first encounter with the IoT-EG's fact sheet about ethics and IoT, however, was not through the EC webpage, though I have subsequently learned a lot about the document from this source. How did I come across this document initially, and why was my interest sparked by it at this particular moment in time?

I vividly remember my first meeting with the IoT ethics fact sheet. At the particular moment in time where the document crossed my path, I had been travelling around Europe for over a year, continuously noticing new initiatives explicitly engaging with matters of ethics and IoT. During the course of my fieldwork, I discovered that ethics and IoT was an explicit concern, so I started searching for scholarly work where the concepts of ethics and IoT appeared. Many articles had just been published and several referred to the IoT-EG fact sheet on ethics and IoT as a literary source supporting scientific research. I decided to look for this document, yet not as an academic reference. I approached the text as another empirical example of an initiative that explicitly engaged with ethical matters at stake in IoT. My first impression of the IoT-EG fact sheet on ethics and IoT was that this piece of writing was entirely different from all the colorful IoT manifestos, the white Dowse box, or the eventful gatherings organized by ThingsCon. This document counted no less than 21 pages made up of large blocks of black text on white pages, a contrast to many of the manifestos characterized by linguistic brevity and original visual graphics. What also separated the IoT ethics fact sheet out from the other ethical interventions into IoT I was engaged with at the time was its timeline. The work of the IoT-EG had started almost a decade before the initiatives I was already exploring across Europe, springing from a context of European policy.

When this document crossed my path in 2018, I was thus struck by a strong sense of curiosity that not only made me read through the document, but to also trace its origins to the EC IoT-EG online portal and all of the pieces of information described above. When it came to my attention that the IoT-EG was set a task by the EC to work on the challenges of IoT, and that ethics had been localized by the IoT-EG as being a central one, I could not help but wonder, what were the challenges of IoT around 2010-2012 seen from the point of view of the IoT-EG in the context of European policymaking? When did ethics appear as a central dimension of IoT in the work of the IoT-EG, and how did the group tackle the question of ethics and IoT in writing?

I quickly found out that minutes from ten meetings preceding the IoT ethics fact sheet were publicly available on the EC webpage. As if these documents held a key to solving a mystery, I read through all the meeting minutes to figure out when and how ethics had shown up as a thematic in the work of the IoT-EG. The knowledge that I have of this expert group and its work on ethics and IoT is not only derived from descriptions on the EC webpage, but further learned from reading these IoT-EG meeting minutes. But what kinds of documents are minutes from meetings, and why are they ethnographically rich artifacts for an analysis such as this one? My initial drive to analyze not just the IoT ethics fact sheet on its own, but also minutes from IoT-EG meetings over the course of two years leads back to the opening quote of this chapter about how the 'lack of conceptual clarity makes it difficult to analyze IoT from an ethical perspective' (Van den Hoven 2013, 2). Given that the IoT-EG ethics subgroup is tasked to somehow factualize ethics and IoT in the shape of a document that will inform ongoing policy work (EC 2010a), this is an interesting quote. If IoT is not conceptually clear and yet has to be turned into a fact, then how has the IoT-EG discussed and defined IoT throughout its meetings? Reading through IoT-EG meeting minutes along with the IoT ethics fact sheet it is evident that the facts of IoT and ethics in this final document are socially constructed (Pinch and Bijker 1984; Latour and Woolgar 1986). Taking my point of departure in the IoT ethics fact sheet I start from the end of the two year journey of the IoT-EG in my analysis of this ethical intervention into IoT. I will, nevertheless, continuously move back and forward in time by including empirical material from IoT-EG meetings to analytically explore this enactment of ethics and IoT. What characterizes meeting minutes, and what can a close reading of these documents shed light on?

#### Meeting Minutes

That different pieces of writing hold rich ethnographic insights is widely acknowledged as presented in the introduction through the thinking of anthropologist and legal scholar Annelise Riles (2006), as well as anthropologist and ethnologist Laura Stark (2011). Riles approaches documents in various shapes from bus tickets to scientific reports as 'artifacts of modern knowledge practices' (2006, 2). Stark similarly considers documents as taking part in knowledge production with a particular focus on writings in the shape of *meeting minutes* among IRBs (2011, 233-234). Riles and Stark articulate themes that inspire my analysis in this chapter, taking its point of departure in a qualitative coding of the IoT-EG documents that has been inductively open to themes recurring in the writings.

In what Riles refers to as 'documentary practices in diverse ethnographic contexts' (2006, 4), questions about production, representation and archiving are often posed (Ibid., 5). Especially in documents about state matters, public accessibility carries a utopian modern imaginary about transparency and possibilities of exchanging information springing from Victorian visions about public archives (Ibid., 5-6). In line with these reflections, Stark writes that 'part of the work of declarative bodies involves creating and then sustaining the image that members have reached a legitimate decision' (2011, 233). Meeting minutes are part of transparently laying out the process of such legitimate decisions, and Stark sheds light on how there will often be a range of requirements for what goes into these documents. In the case of IRB meeting minutes, this includes recording 'attendance,' 'actions,' 'voting,' and: '"a written summary of the discussion of controversial issues and their resolution'" (45 CFR 46.115 in Stark 2011, 235). Stark ethnographically had a chance to follow translations between meeting deliberations and documents, whereas I have an opportunity for looking into discussions taking place in the

broader IoT-EG plenary summarized in meeting minutes in dialogue with what makes its way into the final IoT ethics fact sheet.

According to Riles, documents take part in the constitution of different modern bodies (2006, 5), which is a point resonating with the thinking of Stark on meeting minutes more specifically as she illuminates how they create new social actors and participate in modern statecraft (2011, 237). Not only are social actors created in documents, so are realities, as 'words that appear in or disappear from state-mandated documents, such as meeting minutes, affect what is knowable and how the social world can be known' (Ibid., 242). Let us now turn to the main actor of this chapter the IoT-EG and the ethics subgroup within this collection of experts that will make IoT and ethics knowable to us in a written enactment of the phenomenon (Mol 2002, 33).

#### Constituting the IoT-EG

Inspired by the thinking of Stark about the IoT-EG as a created social actor: how is this expert group constructed, and who is thought to have the relevant expertise about IoT to participate in this group? A growing body of STS inspired studies on expertise direct our attention towards both the contribution and involvement of experts in a variety of contexts (Irwin and Wynne 1996; Lynch and Cole 2005; Collins and Evans 2007; Caudill et al. 2019; Horst 2021). Harry Collins and Robert Evans (2007) make an argument for extending our understanding of what constitutes expertise and its role particularly in public evaluations of technology, a point reflected in the diversity of experts invited into the IoT-EG.

The *Selection Procedure* for the members of the IoT-EG is described more closely in the EC's register of expert groups. It is highlighted that the IoT-EG members 'have been selected from organisations with competence in the areas of Law, Economics and Technology as these apply to the Internet of Things' (EC 2010a). We also get insights into how selected experts come from 'organisations known to the Commission to have a stake in the Internet of Things,' whilst also working both on a European or international level (Ibid.). To 'maximize the diversity of the represented stakes,' experts from industry, unions, privacy advocates and more have been invited to join along with representatives of academia to cater to the emergent state of IoT 'still being developed' (Ibid.). Finally, 'a number of organisations have been granted the status of observers: data protection authorities, security agencies and Member States who have requested so' (Ibid.). This is how the constitution of the IoT-EG is described in the Commission's online register creating transparency and legitimacy around the construction of expertise in this expert group. But what kind of picture is drawn of the IoT-EG and especially the ethics subgroup group in the meeting minutes?

Through meeting minutes we can see that around 40-45 members are physically present on average during the ten IoT-EG meetings of the IoT-EG. During the fifth meeting in June 2011 we learn that the IoT-EG split into subgroups about halfway into its working process. We do not know exactly who participates in these, though some members can be detected in the stated authorship of fact sheets. What I do know from reading through the meeting minutes is that this separation of the IoT-EG is not unproblematic. While Stark brings attention to how minutes from meetings 'required by the state' invent social actors that are 'unitary' (2011, 237), a section in the minutes from the fifth IoT-EG meeting reveals that this is not that straightforward. First of all, expertise is not easily confined to each IoT-EG subgroup so some experts may participate in more than one (IoT-EG 2011c, 5). Secondly, a distinction is made between 'independent experts' and 'stakeholders' in an argument for balancing their presence in all subgroups (Ibid.). Thirdly, we learn that this will be difficult, partly because there are not that many lawyers among the IoT-EG experts even though legal advice is needed across all subgroups (Ibid.).

After this division of the IoT-EG into subgroups, a risk of fragmenting the IoT-EG and its work is brought up. At the sixth meeting a sentence in the minutes states that 'more coordination between subgroups is needed' (IoT-EG 2011d, 7). This is emphasized a few meetings later where 'coordination should start as soon as possible to ensure harmonisation and consistency between the works of the subgroups' (IoT-EG 2012b, 14), a statement tying into the mission of subgroups at this stage to 'finalise the fact sheets and harmonise them' (Ibid.). So, if the IoT-EG both operates as a 'unitary social actor' that is nevertheless also divided into six subgroups, then what can we learn about the IoT-EG ethics subgroup through meeting minutes? Who are the experts on ethics?

As Gry Hasselbalch in the already introduced study attends a panel in Brussels about 'data ethics' in January 2018 she encounters a crucial question: "where are the ethicists?"" (2019, 1). In this tweet searching for ethicists Hasselbalch notices how 'there wasn't the foundation proper, the right expertise was not included - the ethicists were missing' (Ibid.). A challenge in the IoT-EG resonates with the observation, namely a question about what kind of expertise is relevant to include in the ethics subgroup. Minutes from IoT-EG meetings reveal that localizing experts on ethics in IoT is not that easy. While ethics runs as an undercurrent through most conversations taking place during the IoT-EG's work, ethics is not explicitly mentioned as a topic in meeting minutes before the fifth meeting in June 2011, almost one year after the group met for the first time. A range of written sentences in minutes from IoT-EG meetings indicate that the ethics subgroup is difficult to constitute as to why the work carried out by this group is continuously lagging behind all the other subgroups. As meeting minutes both constitute social actors and take part in creating legitimacy and transparency around the processes and decisions they record (Stark 2011, 233), I wish to take a look at how the challenges of constituting the IoT-EG ethics subgroup is portrayed. As Stark writes, 'when social actors are constituted in administrative documents, they are also placed in a storyline. Documents give an official account of events' (Ibid., 237), and in written narrations these events are 'abridged in particular ways' (Ibid., 238). What events are therefore pointed to in meeting minutes in regards to both the establishment and work carried out by the ethics subgroup throughout the IoT-EG process?

At the tenth meeting, it is expressed how a 'key aspect of the work on ethics with respect to IoT is that it is hard to get people engaged in describing the issues involved, even though everyone agrees that ethics is important' (IoT-EG 2012c, 7). Even if ethics in IoT is considered as important in the wider IoT-EG plenary, at the sixth meeting, it is 'stressed that the [ethics] subgroup needs more members and should not only be composed of experts on ethics, but also other kinds of experts, such as economists or lawyers' (IoT-EG 2011d, 7). Since no one has taken on the role as coordinator for the ethics subgroup it is noted that there is a 'need to appoint a new coordinator to this subgroup. An expert from the European Group on Ethics (EGE) might be interested but he could not join the meeting today' (Ibid.). Later in the meeting the ethics subgroup is 'invited to start the work', while the 'EU Commission will look for a coordinator for the ethics subgroup' (Ibid., 12).

At this meeting a tactic is proposed to localize ethical expertise in the IoT-EG and to headhunt an expert from another European group on ethics. At the seventh meeting, the situation is still not resolved; 'More "volunteers" are encouraged to join and support the ethics subgroup. This additional expertise may come from the IoT EG itself and/or from any relevant organisation that is a member of the IoT EG' (IoT-EG 2011e, 15). These examples show how late it is in the IoT-EG process that it is realized key expertise from the outside is necessary to draw into the ethics subgroup. Stark links the transparency of review processes to the involvement of researchers (2011, 239) and in this case, the Dutch ethics and technology philosopher Jeroen van den Hoven is invited into the IoT-EG. Van den Hoven becomes the chair of the IoT-EG ethics subgroup and main author of the IoT ethics fact sheet.

These moments documented in the meeting minutes reveal that the delays in the constitution and the work of the IoT-EG ethics subgroup occur because the kinds of expertise considered to be engaging with ethics is not present in the constitution of the IoT-EG from the outset, and this is why extra forces are invited into the group. As a consequence the work of the ethics subgroup is continuously delayed. At the sixth meeting where a coordinator for this group has neither been localized nor 'volunteered,' the 'Chair explains that there is no fact sheet yet for this subgroup' (IoT-EG 2011d, 7). Far into the IoT-EG process at the eighth meeting in February 2012, drafts of the different IoT fact sheets are starting to circulate within the IoT-EG and yet a 'fact sheet on Ethics needs to be delivered, as it is the only one missing at this stage' (IoT-EG 2012a, 8). At some point the subgroup is finally constituted, and the IoT-EG ethics fact sheet is delivered. But what is so difficult about ethics and IoT when the IoT-EG even as a social actor that is constructed by multiple kinds of expertise cannot localize ethics experts? A quote from the seventh meeting addresses this question:

...there are two worlds: ethical entities (things that "ought to be" – values, norms, laws, ideals, etc.), which are very vague;

and the world of engineering and technology, which is very precise (IoT-EG 2011e, 7).

This quote reveals how different logics are at stake in the IoT-EG where multiple worlds co-exist which I will illuminate in my analysis. While the world of 'ethical entities' is depicted as 'very vague,' the world of engineering and technology is considered to be 'very precise' (Ibid.). The vagueness attached to the world of ethics in this quote speaks to the challenge of localizing ethics experts since it is not clearly articulated what these IoT-EG members need to know. Before moving into the content of different IoT-EG discussions and exploring how the ethics subgroup tackles the question of ethics in IoT, I first shed light on how the IoT-EG, despite embracing different worlds, scope a common course for what its work is a response to.

## The Complexity of Ethics and IoT in European Policy

Returning to the IoT-EG's task to take on an advisory role towards the EC regarding the challenges of IoT on a European level (EC 2010a), I will now look into what the created world of IoT looks like in the work of the IoT-EG and its fact sheet on ethics and IoT. Inspired by Stark (2011) whilst reading through this document, it is clear that an impending sense of urgency and anticipation is sparked by IoT technologies, the 'development towards an IoT is likely to give rise to a number of ethical issues' (Van den Hoven 2013, 2). With reference to European Commissioner Gerald Santucci, the IoT-EG ethics subgroup in the document emphasizes how the IoT 'requires that an urgent extended debate to all sectors of the society is started on the ethics of IoT' (Ibid., 3). An urgency to address ethical matters posed by the development of IoT is expressed not just in the IoT ethics fact sheet, but also at the tenth IoT-EG meeting in a statement about how 'Europe needs to delve deeper into the ethical side before it is too late, and that means now' (IoT-EG 2012c, 12). Not only is an instant debate on the ethics of IoT encouraged, a thorough investigation is called for in that the 'IoT puts forward a great deal of challenges with regard to its governance, technological options, societal impacts including ethical aspects, which requires it to be thoroughly investigated' (Van den Hoven 2013, 3).

As touched upon in the previous chapter, the advent of IoT technologies expose us to ethical problems beyond those introduced by the Internet because 'a virus or hack in an IoT can directly impact the physical realm, have consequences in the 'real life' of people' (Ibid., 11). Following this capacity, a 'malfunctioning IoT technology may entail a much greater impact than traditional Internet services would have' (Ibid.). Pleas for urgently initiating a debate on ethics and IoT are sparked by novel ethical issues introduced by these technologies where existing concepts are inadequate. The IoT ethics subgroup for instance present a limit to considering ethics in the light of 'privacy' and 'data protection':

We must investigate the possibility that IoT generates authentically new situations and experiences in which the notions of privacy and data protection can no longer do all the moral work (Ibid., 12).

The emergent state of these rapidly developing technologies brings with it a great deal of unknown situations not previously conceptually addressing this uncertainty:

As in general with emerging technologies it is a challenge to characterize the technology while it is still emerging. This is an epistemic problem: to which extent is it even possible to know what we are talking about? (Ibid., 13).

The lack of conceptual clarity challenging the IoT-EG's work on ethics and IoT (Ibid., 2) that opens up this chapter is tied to the continuous uncertainty that the ethics subgroup shares with the IoT-EG as a whole. As written in the minutes from the fourth meeting in the IoT-EG:

[It] is hazardous to foresee what is coming. We cannot know what devices we will be able to connect: digital camera? iPad? MP3 devices? Fridges? We can imagine that we will be able to connect a lot of devices. It is stressed that it might even be much more than 50 billion (IoT-EG 2011b, 2).

Even if it is difficult to predict what IoT will bring about, the ethics subgroup describes how ethical issues tie into the development of ICT technologies more broadly. However, 'in IoT, many of these problems gain a new dimension in light of the increased complexity' (Van den Hoven 2013, 2). The authors of the IoT ethics fact sheet claim that the 'internet is already the most complex artefact man has made, IoT goes beyond that' (Ibid.). Bringing forward the complexity of IoT becomes a point of departure for the work on ethics carried out by the IoT-EG since the document 'aims to shed light on this complexity and the ethical and social issues associated with a fully fledged IoT' (Ibid.). I will now unfold why the insistence on the complexity of IoT in the work of the IoT-EG ethics subgroup shall not go unnoticed.

#### Ordering Europe through the Complexity of Science and Technology

Based on a study that also takes its empirical point of departure in the EC's bureaucracy, professor of geography Andrew Barry brings forward an overall claim that 'a concern with the complexity of science and technology has come to have some considerable political significance' (2002, 144). Barry approaches research reports as a 'site for linking "social" and "technological" elements of the European project' (Ibid., 149). According to Barry the whole European project is therefore at stake in documents, adding an important dimension to my analysis of the IoT ethics fact sheet and minutes from the IoT-EG meetings.

Barry describes Europe as 'a superstate in the making' (Ibid., 143), and a relatively new and unstable political entity because the EU is 'an unusually heterogeneous arrangement of elements' (Ibid.). Even though a central purpose of government is 'to reduce complexity and to produce a unified political and economic order' (Ibid., 142), Barry critically questions whether 'the formation of "Europe" has led to a reduction in complexity' (Ibid., 144). In the 1980s and early 1990s, European institutions addressed matters of diversity with the belief that 'Europe's identity could be defined less in terms of its unity, after all, than in terms of its irreducibility' (Ibid., 143). However, Barry in a paradoxical observation brings up that variations at stake across Europe demand 'constant repair by committees of experts' (Ibid., 145). In ongoing attempts to draw Europe together (Ibid., 147), the EU, according to Barry, serves as a fruitful example of 'the art of government-in-the-making, a process of ordering rather than an achieved political order' (Ibid., 143).

Barry's thinking articulates how experts are needed when variations across a heterogeneous state such as the EU need repair and management, arguing that the complexity of science and technology in the context of European policy ties into questions about Europe's very identity and position in the 'New World Order' (Ibid., 149-150). Barry's study also illuminates how accounts of the complexity of science and technology 'inside the political apparatus' express an insistence on integrating rather than erasing technological complexity in European policy (Ibid., 144). The IoT ethics fact sheet serving as 'a reference for policy work now underway' (2010a), provides an empirical entry into analyzing how its authors write the complexity of ethics and IoT centrally into its aim and wish to integrate these matters in European policymaking. Yet the authors of the fact sheet still have to order the complexity of ethics and IoT in a written document which also becomes a mission of Europe's identity and position in a world order where a new digital economy prevails. But how can we understand the ways in which the IoT-EG and the ethics subgroup deal with the complexity of IoT more specifically as they seek to write a fact sheet about ethics in IoT?

Ethnographer and philosopher Annemarie Mol together with sociologist and science and technology scholar John Law illuminate how complexities are handled in knowledge practices. Mol and Law bring attention towards how processes of ordering are an integral part of dealing with complexity (2002, 7). Barry's thinking above opens up how the IoT-EG is not merely ordering the complexity ethics and IoT in documents, but that doing so ties into Europe's position in the world order. Mol and Law articulate what such ordering moves might entail in texts more specifically.

Mol and Law write that 'no one would deny that the world is complex' (2002, 1), and this is why there are 'good reasons for worrying about simplification' (Ibid., 2). In their exploration of complexities and social knowledge practices, they pay attention to how storytelling pieces of writing: 'tend to organize phenomena bewildering in their layered complexity into clean overviews' (Ibid., 3). They do so through 'modes of orde-

ring', and 'various "orderings" of similar objects, topics, fields, do not always reinforce the same simplicities or impose the same silences' (Ibid., 7). Different modes of ordering may co-exist, and especially in the light of simplification one should notice both 'what they foreground and draw our attention to, as well as what they delegate to the background' (Ibid., 11). Orderings of a phenomena into written schematic shapes thus entail simplifications and exclusions that present themselves as silences in the text.

Introducing not just complexity, but also a multiplicity going along with this, Mol and Law bring our attention to acts of holding together (Ibid., 10). They argue that if a phenomenon 'hangs together' it is because 'coordination strategies involved succeed in reassembling multiple versions of reality' (Ibid.). What this quote points to is that holding a multiplicity of realities together entail deliberate attempts to do so. The thinking of Mol and Law open analytically up for noticing how ordering moves are actively made in the IoT-EG process of turning IoT and ethics into a fact sheet. What does an ordering of the complexity of ethics and IoT look like in this document? What are the priorities and incentives in attempts to both order and hold together the phenomenon in its complexity?

Acts of holding together in the IoT-EG's work on ethics and IoT manifest in three different ways. I have already pointed to a challenge of harmonizing the work of the IoT-EG after its division into six subgroups. We will now see how holding together IoT as a phenomenon is difficult throughout the IoT-EG's work before looking into how the ethics subgroup orders IoT as a written ethical intervention into these technologies. Finally, I show how the IoT-EG's attention towards ethics and IoT feeds into a mission of holding Europe together, positioning itself in a world order destabilized by the financial crisis and transitioning towards an increasingly digital economy. I start with looking into how the IoT-EG initiates creating a consensual reality of IoT.

## Creating a Consensual Reality of IoT within the IoT-EG

In administrative documents, Stark with reference to Austin points out how 'people who are authorized to act on behalf of the state [...] can create new consensual realities' (2011, 236). Nevertheless, reading through the IoT-EG it becomes clear that creating a consensual reality about what IoT even is challenges the expert group continuously over the two year process of its work. In this section, inspired by Stark's point about how written words play an important role for what can be known about the world (Ibid., 242), I question what realities around IoT are created through the meetings accompanying the process of writing up the IoT-EG fact sheet on ethics and IoT. Asking further; what is IoT to the IoT-EG?

As the quote from the IoT ethics fact sheet opening up this chapter reveals, IoT is conceptually unclear at the end of the IoT-EG work period. A direct link is made in the IoT ethics fact sheet between the conceptual IoT vagueness and the challenges of grasping

ethics in IoT. This conceptual unclarity sparked my analytical interest as I coded through the IoT-EG meeting minutes. The quote opening up this chapter reveals that even after two years of work in the IoT-EG, IoT is still not firmly defined, so how was this challenge dealt with during the IoT-EG meetings?

We can tell from looking at the volume of minutes from each IoT-EG meeting before even diving into their content that discussions intensified during the course of the IoT-EG's work since the documents grew thicker and thicker – from six pages at the first meeting, to seventeen pages at the tenth meeting. The complexity of IoT does not decrease, and we learn that at the fourth IoT-EG meeting 'it is agreed to try to have one and a half day meetings whenever possible, given the intensity of the discussions that are taking place' (IoT-EG 2011b, 8). It becomes apparent that the IoT-EG struggles to define IoT in every single meeting. Let us first take a look at how the challenge of figuring out what IoT technologies even are manifests through the meetings leading to the creation of the IoT ethics fact sheet, before looking more into the implications of these difficulties and how they are tackled in the actual document.

In every single IoT-EG meeting, it comes to the fore that the group does not really manage to define IoT. At the first meeting, 'a comment is made on the "scope" of the Internet of Things: what does the term mean? [...]. There's a consensus on the fact that while the precise notion is poorly defined, there's a common understanding of what it means' (IoT-EG 2010a, 3).



At the second meeting, 'it is also stressed that definitions need to remain flexible and living, in order to cope with future developments' (IoT-EG 2010b, 7), while on the other hand it is uttered at the third meeting that 'more work is needed on the definition of the IoT' (IoT-EG 2011a, 5). Here a paradox is introduced; there is both a need for more specific definitions of IoT, and a challenge for the IoT-EG to carry out the designated task of the expert group.



FIGURE 17. Timeline – IoT-EG meeting II and III 2011

At the fourth meeting it is brought up that the IoT-EG is working on a piece of writing which starts by 'defining the IoT and this seems not an easy task as a lot of comments have been sent on this point. There are at least eight or ten other definitions that have been proposed by the group members' (IoT-EG 2011b, 3). Again this paradox appears during the same meeting. While the piece of writing calls for an IoT definition, it is 'stressed that

we should not be too specific in the definition; otherwise it will limit its scope. A generic definition should therefore be found' (Ibid.). The definition of IoT matters for what can be addressed, an insight that also speaks to the work of the IoT-EG ethics subgroup.



At the fifth meeting, yet again it is brought up how 'there is still some uncertainty around definitions' (IoT-EG 2011c, 6), and 'the remark is made that discussions still need to take place on definitions, as they are not yet very clear (IoT, "silence of the chip", etc.)' (Ibid., 5). This comment indicates that multiple phenomena are at stake in the IoT-EG discussions which becomes particularly apparent during the seventh meeting.



At meeting seven, it is stressed that 'it is necessary to work on the definition of the IoT and we need a clear idea of what the IoT is' (IoT-EG 2011e, 9). A discussion takes place at this meeting where it is difficult to reach a clarification giving rise to the remark that 'this comes back to the question of the definition that is still not clear' (Ibid., 10).

At the same meeting it is stated that 'we must agree on a global definition of the IoT and develop a European standards roadmap towards achieving effective EU/global coordination' (Ibid., 9-10). Agreeing upon a definition of IoT therefore ties into coordinating attempts both within the EU and globally. We additionally gain insights into how it is not merely a challenge for the IoT-EG to delineate IoT conceptually, but also technologically. Already at the second meeting, members of the IoT-EG address how numerous underlying technologies are a prerequisite for IoT (IoT-EG 2010b, 5-6), and during the IoT-EG meetings many technological concepts enter the discussions around IoT – 'the Internet,' 'RFID,' 'chips,' 'sensors,' 'M2M,' 'application layer.' As a consequence, the subgroup focusing on IoT architecture at meeting seven share that 'from the architectural and technological point of view, the situation is extremely fragmented' (IoT-EG 2011e, 8).



FIGURE 20. Timeline – IoT-EG meeting VII 2011

At meeting eight, 'it is asked whether there is a consensual definition of the IoT. The Chair explains that he felt the IoT EG had agreed with the definition of the European Research Cluster on the Internet of Things (EU IERC 2016), as there has never been any

comment on it when the matter was presented' (IoT-EG 2012a, 8). Finishing off the meeting, the 'Chair asks the members to send their comments, if any, as soon as possible' (Ibid.).



At the ninth meeting it becomes clear that the IoT-EG finds it difficult to limit the scope of IoT in relation to the work on ethics more particularly, and 'a comment is made that the [ethics] subgroup should try to concentrate on the specific characteristics of the IoT. The scope should be narrowed, otherwise the work will be impossible to carry out' (IoT-EG 2012b, 12). While a concern in the IoT-EG at the fourth meeting evolved around a specific definition that would 'limit its scope' (IoT-EG 2011b, 3), the IoT-EG now believes that the work of the ethics subgroup will be 'impossible' if this is not narrowed.



This same challenge reverberates in the IoT-EG as a whole at meeting ten, marking the end of the two year IoT-EG meeting process. Here a discussion triggers a consideration about where to draw the lines around IoT technologies in the work of the IoT-EG:

The discussion raised the question of the relevance of these issues to IoT, in that this term is being used to mean a very broad range of concepts and technologies, and becoming equivalent to the word "technology". This risks defocusing the work of the Expert Group, and it might be beneficial to concentrate specifically on IoT (IoT-EG 2012c, 5-6).

In this quote we learn that the delineation of IoT both conceptually and technologically has implications for the focus of the IoT-EG as a whole. For the IoT-EG it is clearly an issue to balance between attending to the novelty of IoT technologies, with the already existing developments that IoT technologies fold into and out of, and that 'there is continuing disagreement about [...] whether IoT is a new and different entity or an extension of what already exists' (Ibid., 15).



FIGURE 23. Timeline – IoT-EG meeting X 2012

As Stark writes, dealing with various issues or disagreement is an integral part of the work carried out by IRBs (2011, 236), often summarized in meeting minutes along with 'conciliatory words' (Ibid., 249). The words at meeting eight about how the IoT-EG members

must send their definitional IoT comments to the Chair as soon as possible are an ending statement to a moment of discussion within the IoT-EG. The very debate of IoT definitions is not depicted in detail through the meeting minutes, but we do get a sense of urgency tied to reaching a 'consensual definition of the IoT' (IoT-EG 2012a, 8) at this point in time where the IoT-EG has been operating for about a year and a half. Yet we also learn that this goal has been neither reached at the final IoT-EG meeting, nor in the IoT ethics fact sheet. The discussions around IoT definitions in the meeting minutes reveal to us that this is not a straightforward mission. A paradox is continuously at stake where the IoT-EG simultaneously stresses the importance of clear definitions while also striking the need for definitional flexibility.

The wish to nail down a consensual definition of IoT and the hesitation to define the phenomena too tightly in the IoT-EG's process of work resonates with an observation by Jacob Metcalf et al. in their study of 'Ethics Owners' in the Silicon Valley tech industry. Metcalf et al. point to how "ethics" means different things to different people and therefore lacks conceptual and institutional unity' (2019, 457). This point brings forward an ambiguity reflecting the issue for the IoT-EG. While various efforts to institutionalize ethics flourish in Silicon Valley such as ethical guidelines, practices, procedures, lists and principles, Metcalf et al. point to 'pitfalls that threaten to prematurely foreclose what can be thought or done under the heading of "ethics" (Ibid., 455).

The danger of a premature conceptual foreclosure of IoT is expressed in the second IoT-EG meeting, where a quote reveals how some members emphasize that a definition of IoT must be open to 'cope with future developments,' and must remain 'living' and 'flexible' (IoT-EG 2010b, 7). Why is it so important to define IoT and why must we be careful about doing so? The IoT-EG meeting minutes teach us that the lack of a consensual definition of IoT risks defocusing the work of the group, while a too narrow definition will limit its scope. There is no simple answer to the question about what is at stake, yet I wish to analytically explore some implications of the IoT-EG's work on defining IoT in this context before analyzing how this definitional challenge is tackled in the IoT ethics fact sheet.

Firstly, what we gain insights into through the extracted moments from the IoT-EG meeting minutes is that creating a consensual reality of IoT is extremely difficult (Stark 2011, 236). The IoT-EG is struggling to define what IoT even is, and already at the fourth meeting group members have proposed about ten different definitions which lets us know that IoT is not a singular phenomenon (IoT-EG 2011b, 3). This reflects both the technological complexity of IoT, and a diversity in the composition of expertise among the IoT-EG members invited into the group via their capacity to address different aspects of IoT. As articulated by Latour in his introduction of the concept *cosmopolitics* inspired by Isabelle Stengers (1996), a common world is never given, but must be built (Latour 2004, 455). Before we can agree about what something ontologically is in a political arena, all entities must be placed on a negotiating table allowing for disagreement about their very existence (Ibid., 451). As is the case for IoT throughout the IoT-EG's process

of work. The IoT being multiple things for the IoT-EG reflects what Mol and Law describe as 'a pluralism in which different parts of the world coexist' (2002, 10). The group's attempt to reach a consensual definition of IoT invites for an attention towards what it takes to hold a phenomenon together given that coherence is not a given, why strategies must be applied to coordinate and reassemble 'multiple versions of reality' (Ibid.). As mentioned, an increased level of coordination between subgroups is encouraged at meeting six (2011d, 7), while the need for 'coordination,' 'harmonisation' and 'consistency' across the respective groups is addressed at meeting nine (IoT-EG 2012b, 14). The definitional negotiations of IoT in the IoT-EG can be seen both as a matter of agreeing on what IoT *is*, and as an active effort to hold together IoT as a phenomenon and the IoT-EG as a unitary actor.

Secondly, Hasselbalch sheds light on how concepts take part in European policymaking, though definitions are rarely shared (2019, 3). Hasselbalch points to how there is 'no shared definition' of 'data ethics' (Ibid.), suggesting to instead notice how 'different actors and forces [...] mould definitions of "data ethics" in European policymaking' (Ibid., 1). Data ethics initiatives are definitional battlefields whereby power and negotiations unfold, and any definition of data ethics is inevitably colored by values and politics (Ibid., 3). It is worth noting this in light of how the designated task of the IoT-EG is to 'assist the Commission in the preparation of legislative proposals and policy initiatives' (EC 2010a), and that the six IoT fact sheets will inform policy in the making (EC 2010a). Discussions in the IoT-EG about where to draw the boundaries between IoT both conceptually and technologically has implications for the IoT reality that this expert group creates (Stark 2011, 236), informing what can be addressed in European policymaking. As EC policymaking on IoT challenges relies on written contributions that the IoT-EG is tasked to deliver, a premature foreclosure of what IoT technologies are potentially excludes important aspects of these technologies from being taken into consideration. In the IoT ethics fact sheet, it is directly addressed as an ethical thematic how the 'Framing of IoT has implications for both the development of IoT governance and standardization' (Van den Hoven 2013, 13). As a written contribution intended to influence policy work in the EC, the IoT ethics fact sheet cannot be separated from this ethical issue itself.

The discussions about IoT in the IoT-EG illuminate how IoT is a *matter of concern* among the IoT-EG members more than anything resembling a 'fact' (Latour 2004, 231). Yet the written contribution that the IoT-EG subgroups will provide – fact sheets – calls for a factualization of IoT and ethics. The difficulties that the authors of the document face is clear, which also manifests through IoT-EG meeting minutes where a fact sheet from the ethics subgroup is repeatedly delayed (2011d, 7; 2012a, 8). So, how on earth does the IoT-EG go about turning the conceptual and technological unclarity of IoT in conjunction with the 'vague' world of 'ethical entities' (IoT-EG 2011e, 7) into a written fact? If IoT is 'extremely fragmented' (Ibid., 8), or potentially 'the most complex artefact man has made' (Van den Hoven 2013, 2), as the IoT-EG ethics subgroup puts it, the factualization

of ethics in IoT must inevitably entail a great deal of strategies for holding together the phenomenon within a text (Mol and Law 2002, 10).

I will now move on to show how the IoT-EG ethics subgroup deals with not merely grasping IoT, but more particularly ethics in relation to this phenomenon. I analyze how the delineating difficulties are tackled in the shape of a fact sheet, the form that an ethical enactment of IoT takes in this case where writing is the practice that makes IoT and ethics as a phenomenon knowable to us (Mol 2002, 33). What characterizes this written version of ethics and IoT? Where and how do the authors of the IoT ethics fact sheet draw the boundaries around such an all-embracing technological composition into words? What co-existing parts of IoT are of relevance to ethics?

## Factualizing IoT and Ethics in Text

The thematics raised in the discussions during IoT-EG meetings around the technological multiplicity of IoT, and disagreements about what exactly is new about these technologies travel into the IoT ethics fact sheet. In this written enactment of ethics and IoT, the authoring subgroup picks up on the suggestion from the broader IoT-EG plenary to focus more particularly on IoT in their work. In the following quote from a section entitled *Delineation*, the ethics subgroup address the definitional IoT challenge both on a conceptual and technological level, incorporating the advice from the IoT-EG discussion at meeting nine about focusing on the particularity of IoT (IoT-EG 2012b, 12):

Not unlike other emerging ICTs, the concept of IoT still is much debated. The boundaries as to what IoT precisely entails are fuzzy and have many overlaps with adjacent technologies such as the Future Internet, Cloud Computing, Mobile Computing and Ambient Intelligence. By focusing on the defining features that are generally accepted among experts and which distinguish IoT from related and enabling ICTs, the ethical analysis can be further narrowed down (Van den Hoven 2013, 5).

#### Ordering Move Number One: Distinguishing IoT from Other ICTs

In the quote above we see how perspectives from the broader IoT-EG plenary discussion finds its way into the document. As this quote expresses, the IoT-EG ethics subgroup deals with the debated concept of IoT and the technological multiplicity of IoT connective devices by focusing on what *distinguishes* IoT from other ICT technologies in order to narrow down the ethical analysis. In the IoT ethics factsheet, the group somehow moves between explicitly declaring that they will not pursue a very strict definition of IoT, while also feeling a need to offer some sort of definition as the quote below shows. With reference to different sources, the ethics subgroup synthesizes the following conceptualization of IoT, cutting across a commonality in different definitions:

Despite disparate definitions of the expression "The Internet of Things", all the different definitions of it have in common that it is related to the integration of the physical world with the virtual world of the Internet. IoT can be broadly defined as a global network infrastructure, linking uniquely identified physical and virtual objects, things and devices through the exploitation of data capture (sensing), communication and actuation capabilities (Ibid., 3).

In this quote we see how the IoT-EG ethics subgroup goes about defining IoT through a focus on localizing something that various IoT definitions have in common, namely how the bridging of the physical and the virtual is highlighted as one of the most important IoT technology characteristics. This echoes my point in the previous chapter about how exactly this capacity of IoT gains particular attention in the context of ethics. While opening up for the conceptual and technological multiplicity of IoT, the IoT-EG also explicitly shares a delineating tactic to tackle the 'fuzzy' boundaries of IoT, and to narrow down the ethical analysis by distinguishing IoT from other ICTs (Ibid., 5). I argue that this is a first ordering move in this text, taking its very point of departure in the multiplicity of IoT (Mol and Law 2002, 7) as the IoT-EG ethics subgroup seeks to make IoT and ethics knowable to us (Mol 2002, 33) in the context of European policymaking.

This leads me back to the thinking of Mol and Law and how complexities are handled in knowledge practices through orderings in texts (2002, 1). As indicated, the IoT-EG ethics subgroup explicitly places the complexity of IoT at the center of its fact sheet, written with the aim to shed light on the 'complexity and the ethical and social issues associated with a fully fledged IoT' (Van den Hoven 2013, 2). In efforts to order the complexity of the world as is the case in various schemes, we must, according to Mol and Law, pay attention to the simplifications that this process inevitably entails (2002, 2;7). Though the IoT ethics fact sheet is not a scheme per se, it has a somewhat schematic approach to IoT, as it seeks to articulate what is ethically at stake with the advent of these technologies. Several numbers come along with concepts such as the eleven 'defining features' of IoT (Van den Hoven 2013, 4-5), along with six 'key issues' (Ibid., 6-18).

As any other storytelling text, the IoT ethics fact sheet cannot escape but organize and order the phenomenon it sets out to narrate (Mol and Law 2002, 3). While the IoT-EG ethics subgroup embraces complexity in their work on IoT, and given that the shape of the group's deliberations is a written text, simplifications are inevitable (Ibid.). Every time an ordering move is made in writing, silences are imposed since certain aspects are foregrounded while others are delegated to the background (Ibid., 7;11). Yet we can still ask 'how might a simple text respect complexities?' (Ibid., 6). As I will show, 'shades of grey' (Ibid., 2) are not eliminated entirely in the final IoT ethics fact sheet. The IoT-EG ethics subgroup seeks to order the complex phenomena of ethics and IoT, while still leaving space for what is not part of this simplification revealed through meeting minutes. According to Mol and Law, along with complexity comes deliberate efforts to hold together, coordinate and reassemble multiple realities to enable coherence (Ibid., 10). I will now move on from ordering move number one applied in the IoT ethics fact sheet, namely to distinguish IoT from other ICTs, to ordering move number two: a localization of IoT features.

#### Ordering Move Number Two: Localizing Defining IoT Features

Rather than taking a point of departure in a firm definition of IoT, the IoT-EG ethics subgroup deploys the following tactic to accommodate the conceptual vagueness of IoT:

Instead of trying to start from a strict definition of a technology, we start from a set of defining features – characteristics uncontroversially associated with a technology. This starting point of ethical evaluation can accommodate the unavoidable conceptual vagueness, disagreement and interpretative flexibility that are typically associated with new and emerging technologies (Van den Hoven 2013, 2).

Confronting the difficulty of defining both IoT and following on from this ethics, the subgroup working on the IoT ethics fact sheet chooses to tackle this challenge by localizing characteristics of these technologies considered to be relevant for an 'ethical evaluation' (Ibid.). Rather than strictly defining IoT, the IoT-EG ethics subgroup introduces us to the way they simplify and order the phenomenon through a list of defining features to allow for their ethical analysis to encompass the conceptual vagueness of the phenomenon. The eleven defining features of IoT provide a point of departure for the IoT-EG's work on ethics and include matters such as 'ubiquity and pervasiveness', 'Big Data' and 'unpredictability and uncertainty' (Ibid., 4-5). According to the IoT-EG ethics subgroup:

These defining features individually and collectively give rise to a panoply of ethical issues and are used here in the ethical analysis of IoT to describe the connection of technology to moral and social issues (Ibid., 5).

After ordering IoT into eleven defining features connected to ethical issues that these technologies introduce, the IoT ethics fact sheet moves on to localize six 'key issues' where each is then up for 'ethical analysis' through an exemplary case (Ibid., 6-18). The document ends with introducing five 'policy objectives' (Ibid., 19) and five 'policy recommendations' supporting the achievement of these (Ibid., 20-21). The six localized issues include 'social justice and (digital) divides,' 'trust' 'private vs. public,' 'non-neutrality of IoT metaphors,' 'agency,' and 'autonomy' (Ibid., 6-12). Mol and Law describe how endeavors to tame chaotic events often frame these as a risk, turning them into something calculable; the 'modern world is full of technical and scientific simplifications like this, and they are used as a basis for action' (2002, 3). Carving out IoT features and key issues along with examples of actual or potential IoT events that are then ethically

analyzed in the IoT ethics fact sheet is part of the IoT-EG's work towards actionable policy objectives and policy recommendations requested by the EC. I will look less into the content of these policy deliveries, but bring forward how they rest on the ordering of ethics and IoT in the fact sheet as it provides a basis for what can be both ethically and politically addressed. As a written enactment of ethics and IoT, this document offers a particular arrangement of the phenomenon that exposes some aspects whilst leaving out others. I now wish to show how an attempt to respect the complexity of IoT, nevertheless, is incorporated into the ordered textual simplification of the fact sheet on ethics and IoT.

#### Ordering Move Number Three: Holding IoT Together Through Its Separation

What about matters of privacy and security? One might wonder, noticing that these issues are completely absent in the ordering of ethics and IoT in the IoT-EG fact sheet presented so far. Mol and Law point to how such texts develop through many versions asking 'what was added and deleted along the way?' (2002, 6). As the final signs in the title of the IoT-EG ethics fact sheet indicate – *Version* 4.0 – , this is not the only attempt to write a text on ethics and IoT in the work of the ethics subgroup. We might not gain insights into what has been added and deleted along the way in the IoT ethics fact sheet, but deliberate choices about what to include and exclude in this document manifest in the meeting minutes. As Mol and Law allude, a text in the process of simplification occasionally makes 'room within whatever it also necessarily leaves out, for that which is not there' (2002, 6), a gesture where even 'a simple text' might 'respect complexities' (Ibid., 6). In the IoT ethics fact sheet the subgroup prepares the reader that two prominent ethical issues are deliberately left out of the document, namely *privacy* and *security* (Van den Hoven 2013, 5). This choice is explained in the quote below:

Privacy and security issues are considered to be the most important set of ethical issues raised by IoT. As a result they are debated and addressed in depth by the other subgroups of the IoT expert group. To avert redundancy in this factsheet these issues will merely be touched upon (Ibid., 5).

As this quote indicates, the IoT ethics fact sheet is here situated in relation to ongoing work among other subgroups in the IoT-EG. The absence of privacy and security in the IoT ethics fact sheet is, paradoxically, a consequence of just how prominent these ethical issues are, calling for fact sheets of their own (Ibid., 5). This is an example of how the IoT-EG ethics subgroup leaves space for the complexity of IoT in writing, even as it orders the phenomenon entailing deliberate and simplifying choices (Mol and Law 2002, 6). IoT and ethics is somehow held together through its separation from other issues that are ethically relevant. By doing so, the IoT-EG ethics subgroup delegates the prominent questions of privacy and security to the background of their work on localizing ethical challenges in IoT, where these matters would otherwise be foregrounded.

This is yet again an illustration of how discussions from the IoT-EG meetings find their way into the IoT ethics fact sheet. The relation between ethics and privacy is ambiguous throughout the IoT-EG meetings leading to the fact sheets respectively dealing with one or the other (IoT-EG 2011c, 5; 2012a, 4; 2012b, 11). While paying thorough attention to the role of 'brackets' in documents, Riles points our attention to how some subjects tend to be of more intense disputes during negotiations than others (1998, 387). Participants in discussions about what goes into a document occasionally feel like texts artificially separate important issues such as 'economy' or 'environment' into, for example, different chapters 'rather than treating these as a single set of related issues' (Ibid.). An intensity and similar tension exists between ethics and privacy in the IoT-EG. At the fifth meeting, 'participants express that it is interesting to make a distinction between ethical and privacy concerns' (IoT-EG 2011c, 5), but at meeting eight:

A lengthy discussion takes place on whether privacy, security and ethical issues should come together or as separate sections. Overall, the group believes that the three issues should be separated, making clear links between them in the introductory texts. Indeed, although privacy is part of ethics, it today has a legal meaning and many people know something about it, whilst ethics is a much broader issue whose scope is not yet well bounded (IoT-EG 2012a, 4).

Interestingly, the boundless scope of ethics is considered as distinct from privacy. Privacy is more legally graspable and there might be an advantage in keeping an unbounded broadness in regards to what ethics in IoT entails. At meeting eight, a more pragmatic comment is made in the minutes during a part of the meeting where the IoT-EG ethics subgroup presents its work and the identification of issues stating: 'privacy and security: this is already taken care of by another group, but coordination is essential' (IoT-EG 2012b, 11). This reminds us that the IoT-EG must continuously be held together as a unitary social actor (Stark 2011, 237), and it reveals that ethics, privacy and security are entangled issues though separated into different fact sheets. This example also illustrates how ethics is challenging to delineate as it runs implicitly through other concepts. The discussion ends with the following 'conciliatory words' (Ibid., 249), that 'i) Privacy, security and ethics are addressed as three different areas for questions (even if overlaps between security and privacy and privacy and ethics will need to be highlighted in the relevant text)' (IoT-EG 2012a, 5). Here we gain insights into the process behind leaving something out of the final fact sheet on ethics and IoT, and that this ordering move of separation must be emphasized in its text. Even though matters of privacy and security are left out of the IoT-EG fact sheet on ethics and IoT, they still take part in it since the ordering move to separate privacy and security from ethics is addressed through words that transparently reflect this (Van den Hoven 2013, 5).

In the quotes above, it additionally becomes clear that the IoT-EG's work on ethics cannot be separated from the creation of documents. The form of what needs to be delivered by the IoT-EG – texts – affects the way in which the group discusses the topics

in question, and therefore it must integrate this into the written contributions for the EC. This meta-layer runs through most IoT-EG meetings where we are always reminded that documents are being crafted. At meeting six, 'the subgroups are asked to further develop their ideas into a larger document (probably 5-10 pages) by 9 November' (IoT-EG 2011d, 11). And at the ninth meeting, the ethics 'subgroup also tried to formulate objectives, but they are still too close to the issues themselves' (IoT-EG 2012b, 12). This reveals a document structure separating issues from policy objectives and expressing a challenge to keep the two distinct.

As Riles points to, the relation between writing and conversation can be blurry (1998, 389), which is reflected in these discussions where the creation of documents, the main task of the IoT-EG, is ever present. Riles observes how documents during negotiations are 'better imagined as an orientation of thought and action, a state of being, than as a reified object' (Ibid.). Riles notices how negotiating parties tend to live 'through the patterns of the document' (Ibid.), and how the final result of text-generating endeavors is to create 'a "clean" text-that is, a completed text without brackets' (Ibid., 387). What is interesting when looking at the IoT ethics fact sheet and the meetings leading to its existence is that the document in many ways seems like a text full of "not quite brackets". Brackets are not clearly demarcated with signs, but manifest in the very language embracing numerous parentheses such as the explanation of choosing to separate the issues of privacy and ethics. As Stark explains, 'words on paper' affect what can be said (2011, 236), which is reflected in how discussions in the IoT-EG involve the shape of the task that the expert group has been assigned: documents. To sum up, my reading of the IoT-EG ethics fact sheet along with meeting minutes directs our attention towards how this ethical intervention into IoT must take a particular form: a text in the shape of a fact sheet. The form affects both the practices going into this enactment of ethics in IoT and the problems that it allows to emerge.

Even though the IoT-EG ethics subgroup must simplify the phenomenon in writing it, nevertheless, insists on IoT and ethics as a complex matter. This leads me back to Barry's study shedding light on how the whole European project is at stake in documents and accounts of the complexity of science and technology that hold political importance (2002, 144). According to Barry they 'figure in efforts to develop policy that takes proper notice of complexity' and in doing so 'form part of an effort to reorder the world' (Ibid.).

This leads us back to how the IoT ethics fact sheet is intended to influence ongoing policy work (EC 2010a). The IoT-EG ethics subgroup prioritizes addressing what makes IoT distinct from other ICTs through an ordering of IoT that takes its point of departure in the defining features of these technologies in particular. Taking my analysis further, Barry points to how orderings of the complexity of science and technology play a part in Europe's position in 'the New World Order' (Barry 2002, 149-150). Reading through the IoT ethics fact sheet, this point by Barry is not so apparent. Nevertheless, through discussions summarized in meeting minutes we see how the IoT-EG and especially the ethics
subgroup continuously emphasize that attending to ethical matters at stake in IoT, as complex as they may be, holds great promise for Europe's position globally following the financial crisis.

In the following section, I examine how ethics in IoT becomes part of a political economy situating Europe as an ethical pioneer with competitive advantages on a global scale. This leads back to the role that the work of the IoT-EG plays in regards to effectuating the Digital Agenda for Europe (EC 2010). Even though a decision is made on separating privacy and ethics in the final IoT-EG fact sheets, the two phenomena are continuously brought together in meeting minutes where members of this expert group express why it is a good investment to pay careful attention to these matters. While ethics is conceptualized as a potential 'party stopper' (IoT-EG 2012b, 11) at the ninth IoT-EG meeting whereby privacy in also framed as 'the enemy of innovation' (Ibid.), both phenomena paradoxically hold a great potential for Europe's position in an increasingly digital market. They therefore speak to the mission of 'Rebooting Europe's economy' as stated in an updated Digital Agenda for Europe (EC 2014), an agenda that the work of the IoT-EG is commissioned by the EC to take part in post the 2008 financial crisis (EC 2010a).

## Europe Rising Through Ethics in IoT

As Law writes, 'just occasionally we find ourselves watching on the sidelines as an order comes crashing down' (1992, 379). A financial world order has been destabilized post the financial crisis, evident in the Digital Agenda for Europe where it is also addressed how the development of ICTs hold an economic potential to 'get Europe back on track' (EC 2010, 3). Even if ethics and IoT is difficult to grasp as reflected throughout the IoT-EG meeting minutes and in the final IoT ethics fact sheet, it also becomes clear that ethics has great potential for realizing this European agenda for the digital in practice and reorder the world and Europe's position in it.

As already introduced, a figure called the *Virtuous cycle of the digital economy* is presented in the Digital Agenda for Europe (Ibid., 4-6). Professor of Management Peter Bloom declares that the 21st century is the age of neoliberalism and sheds light on how it becomes an ethical duty to maintain a moral market order (2017, 9). According to Bloom, neoliberalism 'has deep ethical roots, which are nourished by the bedrock belief in the morality of the market' (Ibid.). In IoT-EG meeting discussions, arguments for paying thorough attention to privacy and ethics reflect a belief in the potential of these phenomena as drivers of technological innovation in Europe (IoT-EG 2010b, 2011e, 2012c), and as a unique selling point (IoT-EG 2012b, 11).

Already at the first IoT-EG meeting 'a question made on the position of Europe in this landscape' of IoT development is raised (IoT-EG 2010a, 3). The reply is that 'the po-

sition is pretty good. Other regions are investing significant effort, but Europe is playing at least at an equal level with them. Europe has several projects moving forward quickly and a number of companies have many patents' (Ibid.). Europe is here placed in a global order of IoT creation. At the second IoT-EG meeting, it was brought forward that 'the IoT could contribute to innovation in Europe' (IoT-EG 2010b, 1). This potential is linked directly to ethics at the seventh meeting, 'it is stressed that when we are explicit about ethical values, it should not be seen primarily as an obstacle but rather a driver of innovation' (IoT-EG 2011e, 7). This point is elaborated further in meeting ten where it is stated that 'moral values should not be considered as limiting constraints on the successful rapid introduction of innovation, but as drivers of innovation itself' (IoT-EG 2012c, 8). At meeting nine, the ethics subgroup in the broader IoT-EG plenary makes a case for taking ethics seriously:

Issues and challenges: the technology may be used in all kinds of ways, fair or unfair. Although ethics is sometimes seen as a party stopper, paying attention to ethics in an early stage while technology is emerging can be a unique selling point as well. The IoT raises specific ethical challenges, as well as opportunities. We must be as aware as possible of values, norms, laws, ideals and principles to ensure that they are implemented in the technology (IoT-EG 2012b, 11).

This quote suggests that opportunities are embedded in the ethical challenges that the IoT raises, why ethics rather than a 'party stopper' is a 'unique selling point' if addressed at the point of design. Privacy, which is regarded by the IoT-EG ethics subgroup as introducing 'the most important set of ethical issues raised by IoT' (Van den Hoven 2013, 5), similarly to ethics – while appearing to be 'the enemy of innovation' (IoT-EG 2012b, 11) – is also framed as a phenomenon embedding a competitive advantage:

> A remark is made that privacy is often seen as the enemy of innovation. However, we are talking about billions and billions invested in the technology, so we should do it right from the beginning instead of having it fail because of a lack of trust. It is not a burden for innovation but is actually an advantage because it builds trust in the technology. These are the hidden costs of not taking into account privacy from the beginning. It could also be an advantage in terms of competition (Ibid.).

At meeting ten, about four months later, the consideration of privacy in the light of market potential is even more explicitly emphasized:

A further question from the floor commented on the perception of privacy concerns as a burden and an overhead, whereas in fact market research shows that there is a market for privacy and it could become a major growth area (IoT-EG 2012c, 10).

This moment of reflection in the IoT-EG ascribes to privacy a potential for financial growth. Ethics and privacy are not merely seen as forces of innovation with great potential for the European digital economy and its virtuous cycle (EC 2010, 4-6), but also as an opportunity for strengthening European values and as a consequence, a way to influence Europe's position in the world order. Reflections in the quote below convey a moment in the IoT-EG's third meeting where uncertainty about whether Europe in a global context is 'strong enough' to introduce its values and secure a leading spot in IoT innovation, as other parts of the world such as China hold a capacity to 'mass produce the "things":

A concern is expressed regarding the leadership of the IoT discussion at the global level. As it is likely that the steering will come from China or other places, that in practice mass produce the "things", it is questioned whether Europe will be strong enough to put forward its values (IoT-EG 2011a, 2).

In European policy, discussions about ethics and technological development have flourished since the 1990s where the debate according to Hasselbalch 'has increasingly sought to harmonise national laws and approaches in order to preserve a European value framework in the context of rapid technological progress' (2019, 6). In European data ethics initiatives, policymakers attend to 'a perceived threat to a specifically European set of values and ethics that is pervasive, opaque and embedded in technology' (Ibid., 11). Hasselbalch brings up how the whole of Europe as a region is at stake in ethics initiatives in the context of European policymaking. Chair on EU law, ethics and values Markus Frischhut notes further how the EGE plays a role not only in regards to integrating ethics in EU policies, but also in regards to 'furthering the Union as a community of values' (Frischhut 2021).

At the ninth IoT-EG meeting, attention is brought towards how 'ethical issues can be different from one country to another' (IoT-EG 2012b, 12). This leads me back to Barry's thinking; how Europe as an unstable political entity consists of heterogeneous elements, (2002, 143) and must continuously be drawn together through 'a steady process of reordering' rather than through 'any direct imposition of an order' (Ibid., 147). By localizing a set of European values, the IoT ethics fact sheet cuts across countries and variations in ethical issues. Through its ordering of ethics and IoT the document scopes and sediments a common course for Europe in the context of IoT development which ties into questions about how to secure the region and its position in a world order that is increasingly affected by a digital economy (EC 2010). The implementation of a European set of values into technologies is regarded as holding particular potential. At meeting seven it is stressed that:

Europe is leading the global debate on ethics. The idea is to include ethics in the design of ICT technologies (concept of value sensitive design). We have a window of opportunity to do that and we have to seize it (IoT-EG 2011e, 7).

This quote expresses how Europe, according to the IoT-EG, takes a global lead in the debate on ethics in IoT development. Later in the same meeting it is 'stressed that there is no IoT for Europe, but we will have an IoT for the world, even if Europe is leading the way' (Ibid., 10). In line with these points from meeting seven about implementing ethics and European values in the very design of technologies to constitute Europe as a leading force in IoT, minutes from meeting ten state that 'it would be a mistake not to include privacy issues at the design stage. There is a five-year window of opportunity for Europe to become the leading force in IoT, and getting the architecture right is key to this' (IoT-EG 2012c, 11). This leads to a discussion in the IoT-EG about the role of regulatory frameworks for Data Protection 'to boost European competitiveness' (Ibid.), where some emphasize that 'in fact, the USA is currently looking at how Europe is approaching the issue of privacy' (Ibid., 12). This indicates that Europe is already far ahead globally. The IoT-EG sees an opportunity for including privacy in the design of IoT technologies in regards to global competitiveness. Meanwhile, some members express that further regulations to ensure this might not be an answer, yet again placing Europe in a world order: 'IoT is a global phenomenon, and it is therefore important not to constrain European work in a way that makes it valid regionally but hampered globally' (Ibid.).

As becomes evident through the empirical examples that I have presented above, a belief that 'responsible innovation need not be an impediment to business success' (IoT-EG Ibid., 9) is shared among some members in the IoT-EG, advocating for attention to be paid to matters of ethics and privacy. Nevertheless, at the final IoT-EG meeting, the expert group discusses how other parts of the world are equally noticing this potential:

China is keen to embrace responsible innovation, as is Russia. China is examining its implications for cities, bridges, water distribution and roads. Europe needs to delve deeper into the ethical side before it is too late, and that means now (Ibid., 12).

The interest in responsible innovation from China and Russia creates an urgency in European work on ethics and IoT to not lose terrain. Returning to Metcalf et al.'s study of ethics owners in Silicon Valley, they point to how market logics profoundly shape the discourse around ethics in the Valley where 'ethics owners' voice a feeling that '[market] success trumps ethics' (2019, 464). In the case of the IoT-EG, ethics is framed as a market advantage. Hasselbalch points our attention to how many relate critically to data ethics policy initiatives accused of "ethics washing" (Wagner 2018 in Hasselbalch 2019, 2). This speaks to a point by Bloom about how neoliberalism co-opts ethics to strengthen capitalism (2017, 3). We see this logic reflected in the quotes presented in this section of

the chapter where discussions about ethics and IoT both tie into questions about Europe's position in a global world order and take part in holding Europe together through shared values in a time where a financial order has come crashing down since the 2008 crisis. ICT innovation is a new, unknown player in an increasingly digital economy, and the focus on ethics in the IoT-EG's work responds to the Digital Agenda for Europe's wish to boost the European economy by virtue. Arguments in the IoT-EG for paying attention to ethical issues in IoT promote financial promises, introducing ethics in a political economy. Ordering the complexity of ethics and IoT in the context of European policy-making ties into the very formation and position of Europe.

## Conclusion

In this chapter I have analyzed a document in the context of European policymaking containing both the words 'ethics' and 'IoT' in its title as an ethical intervention into IoT. This piece of writing is a culmination of the work carried out in the IoT-EG and its ethics subgroup with a *purpose* and *form* framed by the EC: a written contribution with advice on IoT challenges in the context of especially a Digital Agenda for Europe launched just a few months before the IoT-EG began its work.

My analysis of the fact sheet on ethics and IoT along with IoT-EG meeting minutes directs our attention towards how this ethical enactment of IoT must take a particular form. This affects both the practices going into this enactment of ethics in IoT and the problems that it allows to emerge. Yet while being entitled a 'fact sheet', this piece of writing on ethics and IoT is far from a fact-packed document as it sets out to respond to its mission set by the EC. The form of this document calls for a written factualization of ethics and IoT, and throughout my analysis I have shown how this is not a straightforward task. I have done so with a point of departure in three thematic challenges that the IoT-EG faces. Firstly, I have illuminated that the IoT-EG finds it difficult to define IoT, which ties centrally into a challenge of grasping ethics. This led me to pose a question, asking how the IoT-EG goes about turning the conceptual and technological unclarity of IoT in conjunction with the 'vague' world of 'ethical entities' (IoT-EG 2011e, 7) into a written fact.

Drawing on inspiration from Mol and Law (2002), I analytically moved on to show how the IoT-EG goes about tackling these challenges in the IoT ethics fact sheet through three different ordering moves allowing them to bypass a strict definition of IoT. Firstly, to distinguish IoT technologies from other ICTs. Secondly, to localize eleven IoT features along with six key issues. And thirdly, to hold IoT and ethics together as a phenomenon also through its separation from prominent ethical issues in IoT, such as privacy and security by actively writing the absence of these concepts into the simplification of the document. I then pushed my analysis further to show how acts of holding together also evolved around a challenge of constituting the IoT-EG as a unitary social actor through its efforts to harmonize the work of the IoT-EG following its division into six subgroups (Stark 2011, 237). Inspired by the thinking of Barry (2002), I intensified this analytical gaze by arguing that acts of ordering ethics and IoT feed into a mission of holding Europe together after the financial crisis in 2008. A destabilized world order is evident in the Digital Agenda for Europe where it is also addressed how the development of ICTs hold an economic potential to 'get Europe back on track' (EC 2010, 3).

Even if ethics and IoT is difficult to grasp it becomes clear that ethics has great potential for realizing this European digital agenda in practice by placing Europe as an ethical pioneer in a world order increasingly influenced by a digital political economy. I have shown how the ordering of ethics and IoT in the IoT-EG fact sheet localizes a set of European values, meanwhile acknowledging that 'ethical issues can be different from one country to another' (IoT-EG 2012b, 12). I have suggested that this can be seen as an attempt to both 'preserve a European value framework in the context of rapid technological progress' (Hasselbalch 2019, 6), and to draw Europe together as a heterogeneous political entity through a continuous process of reordering (Barry 2002 143; 147). The whole European project is thus at stake in the enactment of ethics and IoT that the analyzed fact sheet is an empirical example of, a dimension that I could not have incorporated into my analysis had I only read the IoT ethics fact sheet in isolation from the meeting minutes preceding its existence.

A final and important point in this chapter is an attention inspired by Barry towards how the complexity of science and technology seriously 'form part of an effort to reorder the world' as they 'figure in efforts to develop policy that takes proper notice of complexity' (Ibid., 144). This leads us back to how the IoT ethics fact sheet 'will stand as a point of reference for the policy work now underway' (2010a). Though inevitably simplifying the phenomena of ethics and IoT in writing, the IoT-EG ethics subgroup insists on the complexity of IoT by both writing this centrally into its aim and by creating space for what is left out in cuts and choices such as the separation of privacy and ethics. Simplifications in text are a basis for action (Mol and Law 2002, 3), and the reality of IoT and ethics in this document matters since it has implications for what can be ethically addressed in the context of European policymaking.

In the following chapter, I will analyze a very different ethical intervention into IoT where questions about the definition of IoT are not central. Springing from a challenge about the difficulty of relating ethically to something that is not visible to us, the Dowse box materially intervenes into a world increasingly populated by IoT technologies through an enhancement of our sensorial apparatus, allowing us to sense the pervasive presence of IoT that is otherwise imperceptible.

# CHAPTER III

## Cultivating Care

#### Becoming Aware in Order to Care

On a late autumn morning in the beginning of November 2017, I suddenly find myself walking slowly and mindfully around in the so-called *Scrollbar* at the ITU, a venue that I - until this point in time - mostly know well for hosting various lunch meetings, professional events or ITU Friday bars. My encounter with Scrollbar during the early hours of this particular day is, nevertheless, entirely different from my other experiences in the bar. Today I have been asked to participate in a string of "awareness exercises" that involve walking around the bar while continuously expanding my senses and perception, carefully noticing what kind of space I am actually in. Though I have spent quite a few hours here, I have never before been encouraged to pursue such a bodily sensory immersion into these surroundings.

I initially feel like I already know the space quite well. Since I started my PhD at the ITU about 11 months ago, I have intuitively taken note of just how high the ceilings in Scrollbar are, which in combination with a grey concrete like floor and glass facades in 3/4 directions of the room gives the venue a somewhat majestic touch of spacious abundance. That being said, it occurs to me just a few minutes into my re-encounter with this space in a modality of enhanced sensory attention that even though I have been in Scrollbar on many occasions, there are a bunch of decorative details adding to the affective tonality of the space that I never really noticed before. Such as the large number of lightbulbs in the ceiling, just how many speakers are in the room, the numerous options for entering or exiting the space accompanied by emergency exit signs lighting up in green above doors. How the temperature leans towards chilliness. Or how the venue extends quite far back beyond a pillar in its middle that has often somehow functioned as a demarcation of the space allocated for any meeting I have participated in here. Especially in the extension of the room behind this zone, a scent of beer and a blue balloon dolphin on a table in combination reveal that the Scrollbar actually is a bar that hosts parties at the ITU. I had not thought that much about this previously as I rarely attend these parties and only enter the room "professionally" for courses, meetings or events.

My attention also extends beyond the physical glass walls of the room to the outside where a canal is running between buildings with trees growing on its sides. Their thinning crowns of golden-yellow-reddish leaves reveal that it is late autumn as they move in a way that lets me know just how strongly the wind is blowing while a hint of intense autumn sun lights them up. I am at some point invited to close my eyes to explore the space beyond vision, being led around the bar by a stranger yet fellow participant in the awareness exercises together with two-three handfuls of people in addition to myself. The exercise I find myself doing this morning is not that unfamiliar to me. It reminds me of practices I often immersed myself in both as part of my education in contemporary dance more than a decade ago and more recently as part of a six months fieldwork in a spiritual community in the North of Italy. What is new to me, however, is an activation of this mode of attention inside a university building and a digital tech environment.



FIGURE 24. ITU Dowse workshop November 2017

You are probably wondering, what does all of this have to do with ethics and IoT? And who initiated these so-called awareness exercises at the ITU? Well, it is all about this box.

## The Dowse Box



FIGURE 25. The Dowse box – ITU Dowse workshop November 2017

Above you see a box. This is the *Dowse Box*. Or 'The IoT awareness box' (Dowse n.d.), as its creators call it, introducing us to the white square device. The people who entered the ITU on a Thursday in the beginning of November 2017 and facilitated the 'awareness exercises' are from the organization *Dyne*. The sensory exploration of Scrollbar opened up for a day full of experimentation with the Dowse box in a workshop run by Dyne and collaboratively hosted by the ITU and VIRT-EU. The awareness exercises offered an opportunity for sensory insights into the core of the Dowse box, which I will continuously elaborate on throughout this chapter. But what actually is the Dowse box? And how does it ethically intervene into a world inhabited by IoT sensing technologies?

It will come as no surprise to many scholars within various fields, not least STS, that the Dowse box is not just a bounded object revealing all of what it entails at first sight which the empirical vignette opening up this chapter also illustrates quite clearly. As Madeleine Akrich working in the field of sociology and technology puts it, '…even the most mundane objects appear to be the product of a set of diverse forces' (1992, 205), and 'technical objects thus simultaneously embody and measure a set of relations between heterogeneous elements' (Ibid.). Even though Dowse is a relatively small white box, it both embodies and seeks to cultivate innumerous relationships. It engages with a range of huge phenomena in a world inhabited by IoT technologies with an explicitly declared ethical agenda

from its creators stating that: 'the goals for Dowse are in first place ethical' (Dyne 2017, 8). As I will unfold in this chapter, some of the heterogeneous elements at stake in the Dowse box include hardware, software, IoT scenarios, visions, language and more. I will unpack these multiple dimensions of the box throughout the forthcoming analysis where I explore how the Dowse box seeks to cultivate conditions for us to relate to and care about the ethical challenges at stake in IoT through a capacity of the box to make visible the invisible. Let us briefly return to the Dowse workshop at the ITU before I introduce my analytical argument in this chapter and how it will unfold.

After inspecting Scrollbar very closely all participants in the workshop gather in a circle where Jaromil from Dyne reveals the purpose of the awareness exercises before giving us all a chance to learn more about Dowse through hands-on experimentation with the box. Jaromil expresses how awareness is more important than security in IoT because 'it makes us aware of what we care about', as he puts it. Before we start experimenting with the Dowse box, Jaromil explains how we will now connect to things as we just connected to each other. 'We have created a device that allows you to sense the activity of your own network and take care of what it does', Jaromil says while his Dyne companion in crime Fredd adds that: By making visible the invisible Dowse does a bit of magic.

Briefly put, Dowse is an open source software and device making it possible to visualize otherwise invisibly undetectable network traffic pervasively surrounding us in a world increasingly populated by IoT connective devices. Returning to some of the promises of IoT technologies introduced in Chapter I, the capacity of connective devices to reveal phenomena in the world otherwise not manifest to us seems to be a particularly prominent potential. The Dowse box, nevertheless, paradoxically sheds light on how IoT technologies, while they might work as revelatory portals, are characterized by a lack of transparency when it comes to their own operations. Springing from this observation, a central mission of the Dowse box is to give us an opportunity to explore hidden actions taking place on networks populated by IoT devices. 'Dowse gives you a clear overview and full control of what goes in and out of the Internet of Things' (Dyne 2021 n.d.), and you can 'use Dowse to monitor, filter and visualize all your local-area network traffic' (Dowse n.d.). In a document published by Dyne with Fredd (Federico Bonelli) as the stated author, the so-called Design Interface Guidelines 0.4.1. (2015) for the Dowse box are openly described to us. According to this document, 'before Dowse we missed a simple tool that allowed these actions properly out of the technical black magic in the black box operation' (Dyne, Bonelli 2015, 14).

It is explicitly declared by the creators of Dowse that this box is an ethical intervention into a world inhabited by IoT sensing technologies (Dyne 2017, 8), and the box is introduced as not just a box, but an action: 'Dowsing is the new action that we propose for shaping the use and share of information ethically' (Dyne, Bonelli 2015, 2). These quotes explicitly point to ethics as a motivation behind, and purpose of, Dowse. In

the following analysis, I take my point of departure from the question: what kind of ethical intervention into IoT is the Dowse box an enactment of?

Through the Dowse box, I ask: what does it take to be able to ethically respond to IoT? The ethical enactment of IoT through Dowse provides a way to sense IoT with an aim to cultivate care and attention by making visible the invisible. My argument illustrates how the box ethically intervenes in a world of IoT by enhancing our attention and our ability to respond to ethical matters at stake that are otherwise invisible. By turning IoT into a matter to care about (Bellacasa 2017) the Dowse box engages with our very ability to ethically respond to these technologies (Barad 2010; Yosuff 2013; Haraway 2013).

The chapter is composed of five parts. In the first section I will introduce Dyne and the empirical material laying the foundation for my analysis throughout the chapter. In the second part, I present theoretical inspiration assisting me in an exploration of how ethics and IoT is enacted in the case of Dowse. In the third part of the chapter, I take a closer look at what the Dowse box is and what it is a response to by presenting how the aim of the box is to cultivate what its creators call 'Network awareness in the age of IoT.' This leads me to the fourth part of the chapter where I unpack the question of invisibility in IoT as an ethical matter. What is invisibility in IoT for Dowse? And how can we understand it in relation to other work on invisibility and technology? In the fifth part of the chapter, I analyze how ethics is enacted by and through the Dowse box, arguing that Dowse seeks to cultivate conditions for us to care about and respond to ethics in IoT by making visible the invisible. I will first briefly introduce Dyne, the Amsterdam based collective who created the Dowse box, before presenting empirical sources and analytic inspiration.

## Dyne

As described in my introduction of field sites, Dyne is an organization with its headquarters in Amsterdam. The Dyne office is situated in the outskirts of the city center, more specifically in a "harbour zone" where it is one office amongst many in a building floating on water and surrounded by construction work, at least during the period where I was present. Dyne had been on my field site radar ever since I started designing my PhD project. This organization and the Dowse box had sparked my curiosity as a material technological intervention into IoT that self-declaredly engaged with matters of ethics in connection to these technologies. During my three months of fieldwork in Amsterdam in the spring of 2018, I visited the Dyne offices regularly, immersing myself in an atmosphere described in the following extract of field notes from February 2018:

When you are inside the Dyne office, you have a sense of being on board a ship as five tiny round windows are placed in a line on the very top of one of the walls in the room. The windows are marked with golden metallic frames and decorated with a waving cat and multiple plants while a Dyne logo is situated on the wall just beneath the windows. There are 5-6 working tables in the office where a tea pot filled with hot water infused with ayurvedic spices is always present somewhere. You never know exactly how many or who will be here, but a rather full house is 4-6 people. Whenever possible, lunch is served and shared collectively among the people who show up on a given day, most often rice purchased from the food co-op VOKOMOKUM and eaten with chopsticks.

Besides when especially Italian or English words are loudly uttered or exchanged in the room, strikingly few words are spoken in the office for hours where you instead hear a soundscape of taps on keyboards and computers breathing heavily from exhaustion while white and purple codes decorate black screens. Suddenly someone will excitedly say something like: "But how did you do that?!" and you will look around at the screens full of codes while realizing that a lot of communication among the people present in the office has happened without loud words, through numbers and letters displayed on stationary screens.

Extract of field notes February 2018.



FIGURE 26. The Dyne office February 2018

When I re-encountered Dyne in Amsterdam about four months after attending their Dowse workshop at the ITU, their stationary coding engagements at first seemed to me like a major contrast to the sensorially immersive activities opening up this chapter. This way of working, nevertheless, is a central part of the Dowse box that reflects a hacker culture its creators are immersed in which especially Jaromil often brings up. When I was carrying out my fieldwork in Amsterdam, Jaromil and Fredd were my main contacts though I also spent time with and spoke to other members of Dyne.

Jaromil (Denis Roio) is CTO and co-founder of Dyne. He is known as an ethical hacker and a software craftsman involved with various open source initiatives, digital communities and European projects such as DECODE (2021) where Dyne is a partner.<sup>5</sup> In an online presentation of himself, Fredd (as mentioned also known as Federico Bonelli) is involved with what he calls creative research in fields such as multimedia creation and describes his own role in Dyne as a 'self entitled Chief Magical Officer' (NGI 2021). This echoes his attention towards the magic capacities of Dowse to make visible the invisible in the opening vignette. Both Jaromil and Fredd have Italian roots which tie into the history and origins of Dowse as I will return to.

While Fredd and Jaromil were my main Dyne contacts over the course of fieldwork, Dyne embraces an international network of experts. On the official webpage, Dyne.org is described as a non-profit free software foundry and a Think & Do Tank which since 2000 has existed 'as a foundation committed to research and development of free and open source software and services' (Dyne 2021 n.d.*a*). A central aim of Dyne is to contribute to technological developments and the role they play in societies, providing support in the digital age through 'tools, practices and narratives' (Ibid.). Dyne operates 'outside the logic of profit and competition' to 'empower people with the hacker attitude to re/think, re/mix and re/design to circumvent limitations and find a way out from economies based on scarcity and privilege' (Ibid.). As a consequence of this, Dyne supports 'free software development, also when non-profitable' (Ibid.). The following quote describes what software development entails at Dyne while echoing my observations in the Dyne offices of how white and purple codes continuously decorate black screens – 'code is our literature: we build software to communicate, interact and inspire. We let art, science and technology meet open source' (Dyne n.d.).

Throughout the analysis in this chapter Dyne's central values above will be reflected in various qualities of the Dowse box such as; open source, providing new narratives, allowing for new interactions and making it possible to circumvent limitations. In addition, the box speaks to the overall Dyne mission to contribute to technological developments and the role they play in society by addressing ethical questions evolving around invisibility in IoT.

As I described in the introduction to this dissertation, the boundaries of this field site cannot be confined to walls in the Dyne office. In addition to a whole lot of tapping on keyboards, 'the everyday' in Dyne is continuously full of events and travels along with activities outside the office supporting the philosophy of Dyne.

<sup>&</sup>lt;sup>5</sup> DECODE is a project funded by the EU's HORIZON 2020 programme with an aim to develop tools allowing individuals to control 'whether they keep their personal information private or share it for the public good' DECODE 2021a).

Because of this my fieldwork also involved participating in the Amsterdam based organic food coop VOKOMOKUM, since Jaromil believed that this would give insight into their philosophy. The practices going into the Dowse box as an ethical enactment of IoT therefore reach far beyond the office and established working hours. Dyne as a field site reaches from the Dyne underground office to Federico's studio top floor in the other end of the city. From coding to coop. From basement to roof-top. From Amsterdam to Italy to Copenhagen.

In this chapter, I illuminate how you cannot separate the box from the environment in which it came into being. Hanging out with Dyne did not so much mean that I got a chance to see Dowse in action as they did not work intensively on the box while I was there. What the time I spent here offered me was an environmental understanding of the coming into being of this box. In a recently published paper, sociologist Funda Ustek-Spilda et al. (2019) investigate how ethics plays out in practice among technology developers inspired by virtue ethics, emphasizing the value of attending to not merely individual actions, but also the social milieus in which ethics play out. Inspired by this, I will bring forward collective Dyne activities in my analysis of the material practices and relations folding into and out of the Dowse box as an ethical enactment of IoT. As presented in the introduction, this analysis draws on various empirical sources. In addition to participating in the ITU Dowse workshop in the Fall of 2017 and hanging out with the creators of the box in the Dyne offices over the course of three months in the Spring of 2018, I have also come across Dowse at a ThingsCon conference in Amsterdam December 2017 that Dyne took part in. This tells us that Dowse and Dyne have also stepped into a community engaging with ethics in IoT across European borders which I more closely explore in the following chapter. Beyond participant observation, informal conversations and interviews, empirical sources embrace pictures, video material as well as various Dyne publications and words from webpages.

In the following section I will draw the contours of theoretical inspiration that inform my analysis of the Dowse box by allowing me to explore a triangulation of invisibility, care and ethics. These somehow work together in the ethical enactment of IoT that Dowse is as already indicated in the beginning of this chapter.

## A Triangulation of Invisibility, Care and Ethics

In the opening vignette we see how becoming aware and caring is a vital combination for the creators of Dowse if we are to even notice ethical matters at stake in IoT since operations of these technologies are invisible to us. Our ability to ethically respond to IoT is challenged because of this, especially without assistance from a box such as Dowse and its capacity to make visible the invisible IoT activities occurring around us. But how can one analytically approach care in a way that sheds light on the practices of making visible the invisible as an ethical intervention into IoT in the Dowse case? The analytical act of inspecting and dissecting Dowse involves attending to a range of dimensions folding into and out of the box. The Dowse box ethically intervenes into our increasingly IoT populated environments by making visible the invisible, creating conditions for us to care about the advent of these technologies. Working across STS, feminist theory and environmental humanities and with a background in philosophy, Maria Puig de la Bellacasa contributes to ongoing explorations about care flourishing in various fields of research such as animal studies, posthumanist philosophy and ethics (2017, 13), and, I will add, in anthropological research (Navne and Svendsen 2018; Stevenson 2014; Ticktin 2011). Bellacasa's thinking especially engages with STS discussions evolving around what she calls the "more than human worlds" of sociotechnical assemblages and objects as lively politically charged "things" (2017, 14). Bellacasa puts questions of ethics and care into direct dialogue as she introduces us to how ethicalities are involved in more than purely human relations of care (Ibid., 2). She shows how care can be approached as both an interventionist and speculative endeavor, inevitably involving a range of material practices and unfolding in more than human environments (Ibid., 4;6).

Bellacasa brings forward the well-known STS concept about *Matters of Concern* introduced by Bruno Latour (2004) within the field of STS while suggesting a move towards what she conceptualizes as *Matters of Care*. According to Bellacasa, 'advocating for care complements the respect for things as MoC [Matters of Concern] with a particular doing: the practical responsibility to take care of the fragile gathering things constitute' (2017, 45) and 'their becomings' (Ibid., 43). Bellacasa furthermore explains how a matter of care 'inscribes care in the materiality of more than human things' (Ibid., 18).

While Bellacasa does not look into the concept of inscription too closely, Akrich offers an analytical opening to *de-script* a technology by attending to the visions coded into it by its creators through her concept of *scripts* (1992, 122). As briefly touched upon in my introduction to this dissertation, several scholars have brought attention to how 'artifacts have politics' (Langdon 1980), or in what ways morality and ethics is both mediated by and delegated to technological things (Akrich 1992; Latour 1992; Verbeek 2011; Jasanoff 2016; Jørgensen 2016). Rather than looking into how artifacts such as the Dowse box act ethically in and off themselves, my analysis in this chapter attends to how the enactment of ethics in the case of Dowse entails both the environments surrounding the box and is embedded within components of this technological artifact. This invites for not only paying attention to the box as a final and bounded object, but to also look into the process of its coming into being.

Inspired by Bellacasa's concept of Matters of Care (2017, 45) one might ask, what does it take to turn IoT into something to care about? And how can ethics be understood as a matter of caring? In this case of the Dowse box as an ethical intervention into IoT, I will illustrate how an important step towards care in the context of IoT is to make visible the invisible in order to enhance our response-ability towards ethics and these emergent

technologies. Creating conditions for us to ethically care about IoT involves a range of material practices, to follow the thinking of Bellacasa, and I will unfold these throughout this chapter in order to understand what characterizes the kind of ethics that the Dowse box enacts.

In my analysis of how the Dowse box ethically intervenes into IoT by seeking to cultivate conditions for us to care about IoT, it is not an aim to judge whether Dowse succeeds or not. I will not focus on the use of the box as such or evaluate its actual doings. Attending to Akrich's point about how technical objects embody heterogeneous elements, forces and relations (1992, 205), and Bellacasa's attention towards how both "caring about" and "taking care of" involves material practices (2017, 4), I will look into different dimensions of the Dowse box tying into its mission to cultivate care in the context of IoT development. These include the visions and hopes for the box, its material constitution, the conceptual universe in which it is immersed, the social milieus affecting its coming into being, and the collectives that the box is itself part of creating such as the workshop opening up this chapter. All this to better understand ethics and IoT in practice through the lens of Dowse. Let us first take a closer look at the box.

## Searching for Ethical Ghosts in IoT

An inspection of the very name of the box – *Dowse* - helps us get closer to its purpose. While sitting on a curvy stairway running through one of several labyrinth-like hallways in the floating building where the Dyne office is situated both on top of and surrounded by water, Jaromil in an interview shares with me how the idea of Dowse came into being and tells me about the choice of name for the box. A tale reflecting central characteristics of the environment in which Dowse has been brought up. The development of Dowse started in 2013 and the box has a longer history of creation. Jaromil tells me that he started thinking about the box at an Italian hackmeeting where it was not yet called Dowse. Jaromil brings up that the Dowse box was first introduced with a different name and goes on to explain how he at some point wished to change it, and 'then I called Federico, because coming up with a name like Dowse calls for magic. And I thought, I need an expert,' Jaromil says laughing while also confirming Federico's role as a 'magic officer' in Dyne.

The Dowse box goes by many names and is conceptualized in various ways as an 'IoT Awareness Box' (Dowse n.d.), a 'transparent proxy' (Dyne 2017, 5), a 'tool to create awareness' (Roio 2018, 53), a 'privacy hub for the Internet of Things' (IoT Council 2021), or a 'curtain' and a 'door' (Dowse n.d.*a*). The attempt at the core of Dowse to make visible the invisible and to also change the tonality of network language is reflected in the name of the box. As Jaromil elaborately describes:

Dowse is the name given to a free software project to explore the local network and reveal automated events that are normally hidden from humans. The name was chosen to explicitly avoid commonly used metaphors in network language and develop new narratives and patterns of interaction. Dowse was created in the context of the Internet of Things (IoT), as a tool to create awareness, demystify network computing, and enable reflection and action on algorithmic sovereignty (Roio 2018, 53).

As this quote from Jaromil informs, the name of Dowse seeks to both introduce a new narrative in network language and facilitate alternative patterns of interaction by serving as a tool to reveal events otherwise hidden from humans. In doing so, the box creates awareness in the context of IoT. Dowse, however, is not merely a name, but also a verb. 'To dowse' means to search for underground sources of water, metal, and other elements, using a divining rod (Ibid.). With reference to The Oxford English Corpus, Jaromil describes the word 'dowsing' as:

A technique for searching for underground water, minerals, ley lines, or anything invisible, by observing the motion of a pointer (traditionally a forked stick, now often paired bent wires) or the changes in direction of a pendulum (or dowsing rod) supposedly in response to unseen influences (Ibid.).

This quote explains how dowsing is a technique allowing one to search for and respond to invisible or unseen influences. A Dyne fellow taking part in my interview with Jaromil in the opening of this section elaborates on this characteristic in her own words in the quote below:

...dowsing is like searching for hidden energies or something, so it sort of channels back to getting all of these really tiny signals and then sort of intuitively moving towards that. So I think it sort of uncovers all these hidden signals surrounding it, and for me it sort of changed my perception of open space in general. Because of course...everything is waving around us and it sort of opens up like a sixth sense so to say for IoT maybe. Like, finding the ghosts.

Through the capacity to help one uncover hidden signals, Dowse opens up a 'sixth sense,' making it possible to search for 'hidden energies' and 'ghosts' in a world inhabited by IoT technologies. In the words of this Dyne member, she also adds how the act of dowsing changed her perception of 'open space' and its ever-present 'tiny signals.'

In line with these reflections upon the act of dowsing, Jaromil says the following about the name of the box: 'I thought Dowse is a good metaphor for looking for ways instead of blocking, you know. I'm looking for my own way. And I'm doing it in a way that's not established.' This ties into larger controversies around dowsing, found in different European sites to detect hidden information, such as the presence of water using a wooden or metal rod, a practice that is, nevertheless, contested as on the fringe to 'standard science' (Woolley 2018). This somehow speaks to the wish to search for IoT operations in a non-established manner through the Dowse box. In addition, Jaromil emphasizes the importance of creativity to challenge mainstream ways of interacting with networks as a central aim of the Dowse box which is reflected in the name inviting you 'to look for your own way.' Finally, the non-established aspects of the Dowse box also embrace a wish to alter network language where the act of eliminating military references is a central part of the interventionist qualities of Dowse which I will return to.

To sum up, the name of the box underlines the centrality of invisibility as a prominent ethical matter at stake in IoT to be addressed where Dowse serves as an interventionist portal allowing the invisible to become visible. I will now move on to explore what it is that the Dowse box seeks to make visible, and how this act caters to a mission of cultivating 'awareness in the age of the Internet of Things' (Dyne 2017, 8). The overarching theme in the following two sections is to unfold what the Dowse box is a response to both entailing futuristic IoT scenarios while reaching back to design ideals such as the ones from ubicomp introduced in Chapter I and realized through the creation of IoT.

## IoT Scenarios

Dowse initially appears to be a rather small white bounded device. Yet the box entails a voluminous amount of relations and heterogeneous elements as it ethically intervenes into a world populated by IoT connective devices. I now wish to contextualize the box and its purpose by presenting IoT scenarios motivating the creation of Dowse asking: what are the overarching problems in IoT that has led to the existence of the box in the first place? A so-called *Dowse Whitepaper 1.2* (Dyne 2017) opens with a first section painting a picture of an IoT scenario that reveals to us quite a few matters at stake that the creation of the box is a response to:

Running a network in the age of the Internet of Things means hosting the connectivity of multiple devices owned by a diversity of subjects. Often such devices have full access to private, common and public information about humans operating them. Furthermore, devices can talk to each other without humans being consulted, and such interactions are not even manifest. This situation raises issues that are not just technical, but socio-political, about the way connections happen without human consent, within local networks and towards the outside, to and from the Internet (Ibid., 2).

In this opening IoT scenario, some of the major phenomena the Dowse box engages with more broadly in this research are introduced. These include questions of networks and connectivity in the age of IoT as well as privacy. As the quote describes, these matters tie into how ongoing actions of IoT technologies are not even known to us. They are invisible. As a consequence it is brought forward that humans are somewhat bypassed by the devices inhabiting their networks. The Dowse creators emphasize the capacity of things being able to talk to one another 'without humans being consulted' (Ibid.), and that connections might be happening without our consent. Following on from this, a presented claim is that the issues at stake in a world increasingly inhabited by IoT connective

devices are not just technical, but socio-political. This reflects the introduced values characterizing Dyne in regards to approaching technological developments as societal matters to engage with (Dyne n.d.*a*). The Dowse creators predict how 'we are making a major leap towards a world that provides us with contexts that we may not want at all. Getting insight on such situations is crucial for societies at large' (Dyne 2017, 2). This quote introduces an anxiety which motivates the creation of the Dowse box and strengthens how an exploratory and interventionist dimension is central to the device. Through Dowse, we can gain insights into societal situations and contexts that are otherwise somewhat unknown and unpredictable to us. So what is the box capable of?

To put it very briefly, the box allows us to investigate how many devices are communicating on a given network and in what ways. The creators of Dowse explain, in an attempt to illuminate why one would want to know anything about the traffic of one's connected devices, that IoT technologies can be infected by virus, malware or software with a capacity to spy which touches upon questions of surveillance (Dowse n.d.*a*). They reflect upon potential security dangers in IoT as some devices can be activated remotely, and as also exemplified in Chapter I, the creators of Dowse bring to our attention that this is risky, for instance, if you leave your house for a vacation and your connected barbecue breaks out in open flames (Ibid.). In addition, they exemplify how things can actively bypass humans, feeding into a presented incentive for seeking awareness about the behavior of ones' connected devices:

They could be spamming, or participating without your knowledge in a botnet and used for a DDOS attack. They could be doing damages. And all without you being conscious. Even when you don't care that this can happen, you should be aware, since you can be held accountable when your machines are infected and participate in damages. And worst of all, you could be held responsible. You are accountable if your device causes damages or breaks the law (Ibid.)

Echoing the opening vignette of this chapter, the concepts of 'care' and 'aware' yet again relate to one another and take up a central space in the mission of Dowse. The box is a response to a scenario where one does not care or is unaware of what one's connective devices are up to. To exemplify this point, the creators of Dowse bring up an example of a DDoS (Distributed Denial-of-Service) attack, a worrying IoT challenge also followed closely by the The European Union Agency on Cybersecurity (ENISA) and showing how IoT devices are a 'hotbed for DDoS attacks' (2020, 2). The hacker culture, a central characteristic of the environment in which Dowse has been brought up, is reflected in these quotes attending to questions of security and the risk of remote activation of things connected to the Internet. I have now drawn the contours of some of the problems that the box is a response to, but how does the Dowse box address these challenges?

#### Responding to Invisibility as an Ethical Matter in IoT

As Jaromil continues his tale about the coming into being of Dowse during our interview in the floating building that houses the Dyne offices, he tells me a bit more about the Italian hackmeeting from where the box originated. Jaromil explains how it has been running for more than two decades, taking place every year and 'is an activist anarchist big gathering of the hacker communities in Italy.' He also informs me that he considers the hackmeeting as a sort of 'independent university of hacking':

I learned more there than I did in University. About technology, but also about politics. There is no difference. And also the hackmeeting emphasizes how we don't consider hackers as people who deal with computers. So hacking is an attitude of breaking into things. If they don't allow you, customize them.

In these reflections from Jaromil it again becomes clear that Dowse came into being in a culture highly influenced by hacking and creativity, a setting where technology is not considered apolitical. The Dowse box has an interventionist agenda engaging with societal matters further evident in the three key principles for Dowse presented in a box (Dowse n.d.c) included in my co-authored analysis of IoT design manifestos (Fritsch et al. 2018). The principles for Dowse presented in the box state that the 'buzz' surrounding IoT technologies call for attention (Dowse n.d.c), and that one should be able to switch things off and keep one's 'private network private' (Dowse n.d.a). This ties into a mission to 'design for awareness' and allow for exploratory experimentation through the Dowse box to 'create amazing network-aware effects and interfaces' and 'a community of dowsers' (Dowse n.d.c).

To explore these overall principles, we now return to the quote from Fredd during the Dowse workshop at ITU on how the box enacts a form of magic by making visible the invisible. The creators of the box describe how 'Dowse is a transparent proxy facilitating the awareness of ingoing and outgoing connections, from, to, and within a local area network' (Dyne 2017, 5). Besides being a white box, Dowse is a software which 'turns a Raspberry PI into a smart network appliance and captive portal to connect objects and people in a friendly, conscious and responsible way' (Dyne n.d.). The box 'allows you to see what kind of events are happening on your network in real-time,' and in doing so it offers a means to gain insights into what is going on in your home where things invisibly communicate over different networks (Dowse n.d.a). The Dowse box gives you a chance to see every appliance that you have in your home while it 'makes you aware of your traffic and all activities' (Dowse n.d.b). The box also offers an on/off button for devices if they, for instance, seem to suspiciously misbehave due to a malware infection - thus echoing the concerns in the unfolded IoT scenarios from the creators of the box (Dowse n.d.). They believe that 'things like home appliances should have a clear behavior humans can understand and react upon and a simple switch to put them off' (Ibid.).

What is emphasized repeatedly in presentations of Dowse is its capacity to give you back *control*. The questions asked and addressed by the box are 'who is talking to whom,

what, where and when? You can see which device connects to which company and you can turn that communication off, or allow it' (Dowse n.d.*b*). In addition, 'Dowse shades your DNS traffic to your Internet Service Provider' and this is why the creators of the box describe it as 'the digital equivalent of a door and a curtain' (Dowse n.d.*a*). This speaks to the attention towards privacy in the principles for Dowse. Based on these capacities of the Dowse box, its creators describe how they 'call it an Awareness Box. You will be aware of the invisible world surrounding you and your family. To us, this is the first step' (Dowse n.d.*b*). In this quote we see how the aim of 'Design for awareness' ties into a mission of the Dowse box to intervene into an invisible world of IoT connective devices. In the following section Jaromil in an interview ties the question of awareness and the capacity of the Dowse box to make visible the invisible even closer together.

## Network Awareness in the Age of IoT

In an interview, Jaromil explains to me how awareness in the specific case of Dowse means 'making visible the invisible and allowing people a way to customize the way they make it visible.' He elaborates on this statement by explaining to me how everyone has a different way of perceiving things, and while Dowse proposes a visualization, the box also allows you to experiment on your own. Jaromil closely connects awareness to the act of visualizing. Going back to the link between becoming aware through the exercises in Scrollbar, aiming to make us realize what we care about, the process of making visible the invisible in the Dowse Box can be seen as part of this endeavor.

In the Dowse Whitepaper it is stated that the box seeks to create 'awareness in the age of the Internet of Things' (Dyne 2017, 8). Responding to the presented IoT scenarios and problems unfolded above, some of the envisioned solutions embodied in the Dowse box are the creation of a 'transparent proxy' (Ibid., 5), and a 'de-militarization' of terms in network language (Ibid., 3). As I continue my interview with Jaromil he responds to a question of mine regarding the motivations behind creating Dowse which reflects how the creation of the box and the narrative in which it is immersed cannot be separated. Jaromil starts telling me about the motivations going into Dowse, and he says 'I think there are many, but what I can emphasize now thinking about it there are two':

Take control of the network in a way that is not militarized. So it's not even separating the narrative from the way it's done. It's a sort of hybrid, you know. The narrative is part of the way you do it. So rethinking really what we are doing not in terms of 'firewalling', not in terms of 'shield', not in terms of 'oh my God, paranoia'. Thinking about it in a way: I'm in control, I'm going to switch off the Internet; I'm gonna switch it on, and you know, in terms of peace of mind.

These reflections from Jaromil also brings us back to the point described in the Dowse design interface guidelines: how a tool to open up for the 'technical black magic in the black box operation' of IoT connective devices was a mission before the creation of

Dowse (Dyne, Bonelli 2015, 14). The creators of Dowse describe how a tool to enable this act was not the only thing missing: 'we missed a jargon. Within this design effort we establish the basis from which a new set of rules of politeness shall emerge' (Ibid.).

An empirical example of how the developers of Dowse seek to create a jargon that challenges the existing militaristic language surrounding IoT technologies is their take on privacy which they seek to demilitarize by bringing forward the concept of 'privacy awareness' rather than 'privacy protection' (Dyne 2017, 3). As Jaromil describes in the quote above, concepts such as 'firewalling' or 'shielding' lead to a sense of 'paranoia' and feed into a militaristic vocabulary. The Dowse box instead seeks to create awareness and give you back control to facilitate 'peace of mind.' The attempts to alter network language also brings us back to the choice of name for the box where Jaromil as mentioned emphasized how 'Dowse is a good metaphor for looking for ways instead of blocking.'

Corresponding with both how eliminating military references and influencing the narratives that IoT technologies are spun into are a central aspect of the interventionist qualities of Dowse, Fredd during a conversation in a café in Amsterdam explained to me how it is important to break free from 'semiotic cages.' This attention towards language in the case of Dowse resonates with a point brought forward in the previous chapter, where the IoT-EG fact sheet on ethics and IoT as one of five policy objectives points to ensuring 'the adequateness of IoT metaphors' (Van den Hoven 2013, 19). The IoT-EG ethics subgroup therefore emphasizes the importance of keeping an eye on how narratives develop in conjunction with IoT emerging technologies. The Dowse box breaks free from semiotic cages not merely through altering the conceptual language in IoT, as in the case for the IoT-EG where ethics is enacted in the shape of a written document. As the Dowse workshop at the ITU shows, the box offers a bodily activation to engage ethically with IoT. I will return to this shortly in my analysis inspired by Bellacasa (2017), and how turning IoT into a matter of care is an ethical intervention involving a range of material practices.

I wish to take a closer look at not only what kinds of problems the Dowse box responds to by making visible the invisible in a world increasingly populated by IoT. I will move on to the second question I ask of the box, evolving around what kind of ethical issue invisibility is. I will open up for this exploration by returning to the design virtues of ubicomp in the development of technologies (Inman and Ribes 2019, 1), design virtues that the box challenges by somehow ethically reversing them.

#### Re-gaining Attention Towards What Has Been Made Invisible

Bellacasa sheds light on how a range of 'ethical concerns [are] raised by our proximity and involvement with the material effects of our thought' (2017,17). Many academics

point to how IoT technologies are a materialization of the visions in ubicomp (Sharma et al. 2019, 33; McEwen and Casimally 2014, 7; Rose 2014, 11; Tzafestas 2018, 102; Jørgensen 2016, 43; Grönvall et al. 2016, 829; Gabrys 2016, 6). In my co-authored analysis of IoT manifestos, even though ubicomp ideals are attractive from the outset in technological creation, they turn out to be quite problematic when realized in IoT (Fritsch et al. 2018). How does the Dowse box address broken promises of ubicomp as it ethically intervenes into IoT?

In this section, I show how questions surrounding our attention are implicated both in the disappearance of technologies lying at the heart of ubicomp visions, as well as in ethical interventions in IoT such as the Dowse box. However, the value given to technological invisibility differs. In ubicomp, a move towards invisible technologies is seen as a virtue in design because it liberates our attention, considered to be a scarce ressource, as I will now unfold. In the case of Dowse, on the other hand, the box counteracts these ubicomp ideals as it aims to make us pay attention to IoT technologies and the ethical matters they introduce by making visible their invisible operations on our networks. According to the creators of Dowse being aware of activities on your network is important:

Especially in the case that there is something really wrong – you should know. If you enter a room and someone is screaming in a corner, you will notice. A more or less equivalent behaviour over the network is to pass unnoticed to the rest of the users, human, animal, and digital. For months. Until it's too late... (Dowse n.d.*a*).

This quote explains how many events occurring on the network pass unnoticed, making it difficult to know if something is wrong. The three principles laying a foundation for Dowse state that the 'hype' and 'buzz' around IoT connective devices 'requires attention' (Dowse n.d.c), while the design guidelines for the box suggest that it aims to redirect or bring something unnoticed to our attention. Doing so demands deliberate action as it ' is necessary an act of will to bring a message from the liminal zone of perception to our full attention,', which speaks to the interventionist nature of Dowse (Dyne, Bonelli 2015, 6). To exemplify this point, it is described how a humming background noise in your everyday life might not be noticed unless you actively focus your attention on it (Ibid.). However, it can be just a small change in one 'of the elements in [a] situation that makes it emerge out of the limen to our attention' (Ibid.). This piece of information is brought forward to illustrate how the Dowse box targets exactly such liminal zones of our attention, since most of its activities target 'liminal levels of perceptions' and 'the act of dowsing will be developed and designed to activate perceptive states at limen' (Ibid.). As Jaromil puts it, Dowse addresses our 'limited perception (or contextual blindness) in a highly technological environment such as posited by the Internet of Things' (Roio 2018, 54). The ways in which the Dowse box engages our attention challenges the visions of ubicomp which I will now unfold.

#### The Visions of Ubicomp Turned Upside Down

As previously mentioned, STS inspired historian Finn Arne Jørgensen is among many researchers from various scholarly fields who links the development of IoT to the history of ubiquitous computing. Jørgensen emphasizes that 'when something becomes ubiquitous and pervasive, it also becomes invisible and taken for granted' (2016, 51). Across empirical cases, different connections between IoT technologies and ubicomp are often mobilized in ethical questions that evolve around invisibility and IoT technologies. Here the pervasiveness and disappearance of technologies in the shape of IoT along with the concealment of their operations is repeatedly brought up. While a broader concern around IoT technologies and invisibility manifests across the empirical material that I analyze in this dissertation, Dowse differs in that the box engages with the ethical matter of invisibility in an interventionist way. Rather than pointing to the invisibility of IoT seamlessly melting into the background of our existence, the Dowse box aims to show the invisible workings of these technologies, revealing their operations on the network.

In this sense, the taken-for-grantedness which Jørgensen links directly to the invisible characteristics of ubicomp tech lies at the heart of the Dowse box as an ethical intervention into IoT (2016, 51). The box actively seeks to make us care about IoT connected devices through a bodily sensory encounter and engagement with the invisible presence of IoT technologies in our lives. The way in which the creators of Dowse activate our attention to IoT is quite the opposite ideal of ubicomp. As the following extracts illustrate, they are tied to aspirations of making computers disappear and play a more prominent yet invisible role in our lives - a notion in ubicomp that attention is a scarce resource. A liberation of our attention towards technologies is considered to be virtuous which is challenged by the Dowse box. How is a move towards invisibility in tech development seen as 'good' when it is clearly in many ethical interventions in IoT dealt with as something potentially 'bad'?

The question of 'attention' is a matter that several scholars either inspired by or moving across STS, design and HCI bring up in their research into ubicomp introduced in Chapter I (Gabrys 2016; Inman and Ribes 2019; Kerasidou 2019). They do so in a way that speaks to the taken-for-grantedness addressed by Jørgensen (2016, 51), pointing to a liberation of attention as an intentional design value in ubicomp. Xaroula Kerasidou, taking a point of departure in feminist STS, examines how technologies in ubicomp visions will 'be so ubiquitous that no one will notice their presence' (Weiser 1991, 94 in Kerasidou 2019, 99). In a recent publication by Sarah Inman and David Ribes (2019) across scholarly fields of ubicomp, HCI, CSCW and STS, they similarly refer to computer scientist Mark Weiser's writing about how 'a good tool is an invisible tool. By invisible, I mean that the tool does not intrude on your consciousness; you focus on the task, not the tool' (Weiser 1994). Inman and Ribes show how 'the user' in the ubicomp visions of Weiser is approached as not having unlimited attention why a reduction of distractions is to be aimed for (2019, 7). Aspirations towards the physical integration of computers seamlessly into the environments we inhabit was a matter of 'relinquishing

demands on our attention' (Ibid. 4), Inman and Ribes describe how seamlessness in this area of computing is a design value to strive for (Ibid., 2). Citing Weiser together with John Seeley Brown (1996), Inman and Ribes bring forward how a 'computer will ideally become 'so fitting, so natural, that we use it without even thinking about it' (Weiser and Brown 1996 in Inman and Ribes 2019, 4).

This leads us back to Chair in Media, Culture and Environment Jennifer Gabrys' portrayal of ubicomp introduced in Chapter II, how this field of computing, rather than making the invisible visible, seeks to increase the level of invisibility (2016, 6). Gabrys connects this mission to the question of attention, that 'the environment that Weiser would have computing disappear into was a very particular type of milieu, one of inattention and everyday activity, an automated surround that did not require reflection or focus' (Ibid., 9). Gabrys directly highlights *inattention* as an aspirational ubicomp quality brought about by the disappearance of computing. It is exactly these interpretations of ubicomp with its design virtues of invisibility and inattention that the Dowse box engages critically with and somewhat counteracts by inviting us to pay attention to IoT by making visible the invisible.

Inman and Ribes describe how a dance between revelation and concealment of technological operations takes place, arguing that an ambiguity of (in)visibility in design is brought to life through this dance (2019, 1). In the examples above, we see a sprouting critique of seamlessness and the invisibility entailed in this design value. Paradoxically, while technological invisibility is imagined as 'good' this quality can just as easily present itself in contested ways as something really 'bad'. Inman and Ribes for instance with reference to ongoing research write how a design virtue of seamlessness for some is now equated with 'invisible and closed', meanwhile seamfulness is equated with 'visibility and openness' (Ibid., 5).

Dowse calls for openness both by being an open source creation and through its capacity to transparently visualize invisible workings of IoT technologies directing our attention towards that which goes unnoticed. I will shortly look more analytically into this mission and what characterizes the kinds of ethics that the Dowse box enacts. I first wish to indicate how other scholars have approached questions of invisibility to introduce an overall argument about how invisible does not mean immaterial. This point lays a foundation for unpacking a range of material practices that fold into and out from the Dowse box, that in turn take part in changing IoT into a matter of care as an ethical intervention into IoT and enhances our ability to respond to the phenomena.

## Invisible Does Not Mean Immaterial

I will now illuminate how scholars approach invisibility in relation to technology, especially those in STS inspired studies of infrastructures and how they, similarly to Dowse, mobilize questions of ethics. Nevertheless, a deeper analysis of the coupling of

these phenomena more directly is left open for further exploration. Classical STS studies of how hidden dimensions of technologies are made visible through infrastructural breakdowns (Hughes 1993, Star and Bowker 1999) and more recent studies across STS, anthropology, design and HCI (Larkin 2008; Jørgensen 2016; Grönvall et al. 2016; Inman and Ribes 2019; Winthereik et al. 2019; Ballestero 2019) bring up revelation as a scholarly mission: 'there is an ongoing commitment in STS to infrastructure, to making it visible, remarked upon' (Winthereik et al. 2019, 352). In a sense, the mission of Dowse speaks to this commitment as the aim of the box is to make something visible beyond the technological breakdown, revealing to us ongoing invisible operations of IoT technologies in the shape of network traffic made perceptible through the act of dowsing.

In the vein of how infrastructures tend to mostly become visible to us once they break down, Ballestero is interested in how subterranean spaces are brought above the surface beyond the breakdown (2019, 2), resonating with the purpose of Dowse. Ballestero explores how to turn something that is not quite an object into a 'recognizable entity,' which involves an 'act of interpretation' distributed across humans and nonhumans (Ibid., 15). As an example, Ballestero brings up the involvement of remote sensing (RS) technologies in measurements of subterranean water (Ibid., 3). While Ballestero's study analyzes an empirical example of interpretive acts bringing something hidden to the surface, echoing the aim of Dowse, other scholars engage with how to make something invisible senseable to us such as wifi activity (Grönvall et al. 2016) or energy (Winthereik et al. 2019). For example, within the field of STS, Britt Ross Winthereik et al. argue that 'the digital' might play an important role in activating 'an embodied connection to that which is not quite seen' (2019, 350).

As researchers grapple with invisibility, some highlight the materiality of computing even when it comes to seemingly immaterial dimensions such as 'the Internet' or 'clouds' (Armbrust et al. 2010; Preist et al. 2016; Dourish 2017). Winthereik et al. point to Nicole Starosielski's (2015) research in the field of media infrastructure on undersea cables constituting the Internet. This research shows us how 'the invisible "cloud" connecting our devices and data is actually a rather centralized and very material set of fiber-optic cables' (Winthereik et al. 2019, 352). This resonates with Inman and Ribes' exploration of seamlessness, where they bring forward exactly the 'cloud' as a central example for scholars who 'call for remembering the forgotten materiality of computing' (2019, 1), with reference to professor of informatics Paul Dourish (2017). This links back to the visions of ubicomp and the role of computing in our lives as visible or invisible. In a similar vein, yet with a different emphasis, Erik Grönvall et al. in the field of design show how the infrastructure of wifi might be visible through cables, but that the traffic is most often absent in our everyday lives (2019, 829). As a consequence they designed *Feltradio*, a box similar to Dowse that enables us to sense wifi activity through Electrical Muscle Stimulation (MSE) rather than vision (Ibid., 830). The considerations folding into Feltradio and its interventionist agenda speak to the attentional enhancement that the Dowse box seeks to enable.

As described in Chapter I, numerous ethical questions in IoT evolve around networks across the broader body of empirical material underpinning this dissertation. This, for instance, manifests in reflections about ownership of data or energy consumption and why choices of given networks in IoT have ethical implications. However, Dowse engages ethically with networks not only by focusing on their constitution, but by seeking to make network traffic senseable to us as an ethical act. As Fredd shared with me, Dowse was the minimum intervention one could think of to shed light on this.

Interestingly, as scholars approach invisibility in design, HCI and STS they indicate an ethicality to endeavors of making visible the invisible, the sense-able of what we cannot otherwise sense, reflecting the potential of a box such as Dowse. A technological intervention can enable us 'to understand the ethical implications of our densely populated airwaves' (Grönvall et al. 2016, 837), or engage visitors emotionally and morally in regards to questions of energy (Winthereik et al. 2019, 354). This illustrates how approaching the invisible often seems to entail an ethical agenda. Additionally, there is a normative tonality towards the end of Inman and Ribes' paper where they write that the designer must always ask 'what specific kind of backgrounding has occurred, and what kind of interaction may be of use revealing it' (2019, 10). This introduces revelation as a design virtue that echoes the introduced mission in STS to make infrastructure visible and remarked upon. However, even if ethical dimensions often seem to be part of engaging with invisibility in more than human worlds, a deeper analysis of how ethics plays out in these cases is open for further exploration. I will now enter this analytical opening by exploring how conditions for making us care about IoT are cultivated through the Dowse box and its creation to make visible the invisible and thereby to enhance our ethical response-ability.

#### Enhancing Our Attention to New Spheres as an Ethical Act of Care

I now return to the quote by Jaromil from the Dowse workshop at the ITU in the Fall of 2017 where he shares with all participants that the purpose of the so-called 'awareness exercises' is to make us 'aware of what we care about.' A participant in a Dowse crowd-funding presentation in Amsterdam December 2016 expresses in a video from the event that 'most people don't care [...] because it's too difficult to care,' adding that Dowse 'makes caring easier to carry out' (Dyne 2016). Following on from this centrality of care as the mission of Dowse, the box seeks to cultivate conditions for caring as an ethical intervention into IoT, or in the words of Bellacasa, to turn IoT into a matter to care about (2017, 45).

At the ITU Dowse workshop, Jaromil after emphasizing the importance of becoming aware of what we care about reveals that as a next step we will now 'connect to things as we just connected to each other.' We will do so through hands-on Dowse experimentation. The need for a concept of ethics reaching beyond the human is increasingly relevant here to form an analysis of how the Dowse box ethically intervenes into a world populated by IoT connective devices. How can one analytically approach care in a way that sheds light on the practices of making visible the invisible as an ethical enactment that reaches beyond the human to embrace multiple dimensions in the case of Dowse?

Bellacasa links matters of care to questions of ethics arguing that more than human relations of care involve ethicalities (2017, 2). According to Bellacasa, humans embrace 'things, objects, other animals, living beings, organisms, physical forces, spiritual entities' and are all entangled on this planet with shared faiths (Ibid., 1). In her thinking, Bellacasa highlights that care means 'different things to different people, in different situations' (Ibid.), and as a consequence she calls for attending to the 'situatedness' of care (Ibid., 6). In the case of Dowse a clear definition of care is not brought forward. Bellacasa nevertheless assists in opening analytically up for how to approach care ethnographically by bringing our attention to 'inquiries into actualizations of care' (Ibid., 3). This means that rather than trying to figure out exactly what the creators of Dowse mean when they use the word care and seek to nail it down conceptually, I can analytically explore how they actualize care in the context of ethics and IoT with the Dowse box as an empirical example. From Bellacasa's point of view, 'ethnographies of care show how absurd it is to disentangle care from its messy worldliness' (Ibid., 10), and she suggests that acts of care must be supported by 'material practices' (Ibid., 4).

In her thinking about the relation between care and ethics, Bellacasa raises a critique towards anthropocentric understandings of ethics since care moves beyond dichotomies such as the divide between nature and culture (Ibid., 13). Bellacasa therefore calls for a displacement of 'traditional understandings of the ethical' (Ibid., 22). Rather than focusing on 'ethical obligation' or 'moral principles' (Ibid.), Bellacasa is interested in the role of material forces:

...the "ethics" in an ethics of care cannot be about a realm of normative moral obligations, but rather about thick, impure, involvement in a world where the question of how to care needs to be posed. That is, it makes of ethics a handson, ongoing process of re-creation of "as well as possible" relations and therefore one that requires a speculative opening about what a possible involves (Ibid., 6).

Here Bellacasa emphasizes that an ethics of care involves processes of relational recreations entailing a speculative dimension, asking of us to consider *how to care* and involving 'affective, ethical, and hands-on agencies of practical and material consequence' rather than 'a moral stance' (Ibid., 4). The question from Bellacasa about how to care as an inevitable part of ethics leads us back to Dowse and how this box seeks to enable and make caring easier to carry out in the context of IoT. The Dowse box engages with the question that Bellacasa poses about how to care as a crucial part of ethics. In the following section, I will analyze and empirically exemplify material practices that go into the Dowse box to realize its mission to make us care about and thus respond ethically to IoT.

As mentioned earlier, Bellacasa sheds light on how matters of care: 'inscribes care in the materiality of more than human things' (Ibid., 18) without unpacking the concept of inscription in detail. Akrich on the other hand, through her concept of *scripts*, offers furthering of analytical possibility into 'de-scripting' a technology inviting us to explore the visions coded into it by its creators (1992, 208). An overall point from Akrich is that 'the designer expresses the scenario of the device in question – the script out of which the future history of the object will develop' (Ibid., 216). In the vein of various scholars working with things as unfolded in the introduction, Akrich describes how technical objects 'bring together actants of all types and sizes, whether human or nonhuman' (Ibid., 206), and notices a reciprocal relation between 'the technical object and its environment' (Ibid., 207). According to Akrich, technologies can 'lead to new arrangements of people and things' as to why they hold a capacity to generate new 'orders' and 'forms of knowledge about the world' as well as 'moral judgements' (Ibid.), and that their creators play a central role:

Designers [...] define actors with specific tastes, competences, motives, aspirations, political prejudices, and the rest, and they assume that morality, technology, science, and economy will evolve in particular ways. A large part of the work of innovators is that of "*inscribing*" this vision of (or prediction about) the world in the technical content of the new object. I will call the end product of this work a "script" or a "scenario" (Ibid., 208).

To sum up, the implications of the presented thinking across Bellacasa and Akrich show how an approach to ethics asks us to pay attention to the material and more than human aspects of ethical enactments, rather than solely focusing on moral principles or the cultivation of character so central to a virtue ethical approach (cf. Vallor 2016). A virtue ethical gaze which, as already introduced, is widely influential in the turn towards ethics within the field of anthropology (Faubion 2011; Mattingly 2012; Lambek 2014). If we approach care as being both inscribed in artifacts and a speculative interventionist engagement that is inevitably ethical, then we are invited to do a "de-scription" of the Dowse box as part of analysis. This allows an exploration of what characterizes the kind of ethics enacted in the context of IoT that Dowse stands as an example of. I will weave elements extracted from the thinking of Bellacasa and Akrich into empirical examples. The introduced theoretical points of attention allow me to unfold how different material practices are part of cultivating the conditions for us to ethically care about IoT, and that the Dowse box is an interventionist way of opening up an ability to care. This will lead me to a discussion of how the Dowse box enables a re-creation of our relations to IoT (Akrich 1992, 207; Bellacasa 2017, 6) by enhancing our ability to ethically respond to these technologies, calling for us to regain attention to what has been made invisible in the creation of IoT connected artifacts.

I now move on to 'de-scribe' the Dowse box and illuminate how turning IoT into a matter of care involves a range of visions and practices. This square white device intends to ethically intervene into a world inhabited by IoT technologies by enhancing our attention towards invisible IoT operations. I bring forward three examples of this. Firstly, I show how visions and scripts of the box draw a picture of how the box is situated within a more than human universe calling for a concept of ethics not solely confined to humans. Secondly, I briefly indicate that the constitution of Dowse as a created artifact embeds not only visions, but also translations of these into design choices where values are reflected in the very box and in practices carried out in the social milieus surrounding it. Thirdly, I open up an argument for the interventionist and speculative dimensions of Dowse that characterize this ethical enactment of IoT. These three overarching dimensions are not strictly separate, but combine into one another.

#### Caring For a World Populated by IoT Technologies

As already brought forward through a quote from Jaromil, Dowse can 'reveal automated events that are normally hidden from humans' (Roio 2018, 53). This shows how the box is part of a more than human universe inhabited by IoT connective devices, and invisible events that call for experimenting with how to bring about revelation and transformation. This engagement with connections reaching beyond the human is further strengthened in the Dowse Whitepaper 1.2, painting a picture of how Dowse as a 'digital network appliance for home based local area networks (LAN) [...] makes it possible to connect objects and people in a friendly, conscious and responsible manner' (Dyne 2017, 3). This brings us back to Jaromil's words from the Dowse workshop at ITU and the awareness exercises, making us all conscious of what we care about through experimenting first by connecting to each other and then to things through experimentation with the Dowse box. As Jaromil explained, Dowse 'allows you to sense the activity of your network and take care of what it does.' These examples illustrate how care and the ethical enactment of IoT in the case of this box is a more than human matter. As Bellacasa highlights how ethicalities are involved in relations of care reaching beyond the human she sheds light on a radical interconnectedness (2017, 2). A gaze on the world that also characterizes the Dyne approach to life, the aims of Dowse expressed in the box as well as in the descriptions of it before, during and after its creation. The language describing the Dowse box is pervaded by co-existence.

In an extract from the document presenting the design guidelines for the box, drafted before its coming into being (Dyne, Bonelli 2015), we see how the creators of Dowse as articulated by Akrich 'inscribe' their visions into this new technology, as 'like a film script, technical objects define a framework of action together with the actors and the space in which they are supposed to act' (1992, 208). In the design guidelines for Dowse, the 'Dowser' and experimentation with the box is envisioned, entailing an inclusion of more than humans. In the quote below we get a sense of how 'Dowsers' are imagined

to make visible the invisible IoT operations on our networks through Dowse, visions that are inscribed in the anticipated capacities of the box:

Shape, light quality, shadows, sounds character and musicality, speed of movement, interdependence with neighboring elements, particles attitude, color and modes of organizations, as well of other sensorial qualities, are all tactically to be used as awareness modes, to represent information in the perceptual sphere of human and non-human activities alike (Dyne, Bonelli 2015, 6).

As described in this quote, a range of so-called 'awareness modes' will mobilize different 'sensorial qualities' through Dowse to engage with information on both 'human and non-human activities' (Ibid.). In addition, the active role of the dowser is imagined and experimentation with representing data flows is encouraged. This also suggests an element of creativity and exemplifies how acts of dowsing while seeking to make visible the invisible reach beyond visualizations to include sounds and messages. Touching and tapping on keyboards, sound, hardware and software components are all part of dowsing. This echoes the point by Ballestero, how acts of interpretation distributed across humans and non-humans play out in attempts to turn something that is not quite an object into a 'recognizable entity' (2019, 15). During the Dowse workshop at ITU, I had a chance to see how these scripted visions for the box played out in practice when participants experimented with Dowse as exemplified on the picture below, showing the communicative activities happening on a network.



FIGURE 27. Dowsing at the ITU Dowse workshop November 2017

What I wish to illustrate is that visions for Dowse paint a picture of how the box will ethically intervene into a more than human universe populated by IoT technologies, visions that are inscribed into the very technology itself. As the picture above conveys, information is represented through different colors in this visualization of network communication enabled by Dowse, and the participants carrying out this experiment also worked with sound, incorporating several dimensions imagined in the design guidelines for the box above. Akrich brings to our attention that technologies might offer an arrangement of people and things that is novel and informs morality (1992, 207), while Bellacasa highlights how a speculative re-creation of relations is a central part of an ethics of care (2017, 6). Examples of dowsing from the workshop at ITU illustrate the multiplicity of forces beyond the human coming together in experiments with the box. The quote from Jaromil about how Dowse experimentation as an act of caring can connect us to things just as much as how we connect to each other expresses a wish to explore and alter our relations to IoT artifacts increasingly populating our lives. As does the quote introduced above about how Dowse as a digital network appliance enables a responsible way of connecting artifacts and people (Dyne 2017, 3). A mission that attends to both human and non-human activities as presented extracts from the design guidelines for the box also indicate.

To sum up, the motivation behind the creation of Dowse and the purpose of the box is to intervene with and transform the ways in which we inhabit a world populated by IoT connective devices, creating conditions for us to ethically care about their operations on our networks by making visible the invisible. But what does the box consist of that allows it to achieve what it is capable of?

#### Inscriptions of Care in the Dowse Box

While Akrich focuses on how designers inscribe visions when they develop new technologies (1992, 208), Bellacasa attends to how care is inscribed in the materiality of things (2017, 18). For the presented visions of Dowse to be realized in practice, the creators of the box continuously make choices regarding its constitution. Dowse can run on small computers or boards such as a Raspberry Pi (Dowse n.d.), and the invention supports many written languages and scripts such as 'Shell, C, Perl, Python' (Dyne n.d.*b*). The creators of the box describe they 'added to the mix: Open Sound Control, MQTT, NETDATA, Websockets and all the good stuff to play with it' (Dowse n.d.*b*). As is the case for each component in an IoT device as brought up in Chapter I, each element of Dowse reflects different values.

To pull out a central value that the creators of Dowse care about, *openness* is in various ways a central part of the Dowse box. *Open source* as a value in Dyne is reflected in numerous choices about the design of the box. The source code of Dowse is accessible on Github (Dyne n.d.*b*). The revelatory potential of the box opens up for both 'the technical black magic' and 'the black box operation' of IoT technologies populating our

networks (Dyne, Bonelli 2015, 14), also speaking to the value of bringing what is invisible or concealed out into the open.

As Akrich in her thinking on technological scripts shows how technologies embed various forces, choices and elements, she also sheds light on how there is a reciprocal relation between objects and the environments in which they come into being (1992, 206-208). Dowse cannot be separated from the environment in which it came into being, making this tiny white box embrace numerous relations For example, in the design guidelines for the box numerous 'sensorial qualities' and different 'awareness modes' in Dowse experimentation such as 'shape,' 'light' and 'sound' are introduced (Dyne, Bonelli 2015, 6). This activation of our sensorial apparatus is a central part of how Dyne works and is furthermore reflected in the awareness exercises opening up the Dowse workshop at the ITU, and in the different everyday activities at the office that I participated in during my fieldwork. While the many hours of coding in the Dyne office at first seemed to me like a contrast to the bodily, sensory and immersive activities at the ITU Dowse workshop, quickly after my arrival I got to experience another collective action among the members activating my senses. The members of Dyne share an outspoken appreciation of watching sunsets together, a sensory immersion into our surroundings that reflects the more than human universe which the Dowse box is ethically intervening into.

The fact that Dyne members themselves activate their sensory repertoire reflects an approach to the question about 'how to care' posed by Bellacasa (2017, 6). This query is translated into the ways in which the Dowse box seeks to cultivate conditions for us to ethically engage with IoT, by making it possible for us to sense and take care of invisible IoT operations in our networks. A sensorial enhancement becomes a central part of caring about and paying attention to ethics in IoT, as Dowse created with it an interventionist aim that seeks to alter IoT situations and re-create our relation to the connective devices among us. According to Bellacasa, intervention and speculation are crucial dimensions in a care ethics (2017, 6), a point which she supports with reference to ethnographer and philosopher Annemarie Mol's work on how articulating 'good care...is an intervention' (Mol 2008, 84 in Bellacasa 2017, 6). In the following section, I will look into how Dowse has inscribed within its design an aim to change how we live with and relate to IoT, and how the box in actual and speculative ways ethically intervenes into these technologies among us.

#### Care as an Ethical Intervention

Bellacasa approaches care as 'intrinsically involving an ethical and political intervention' (2017, 6). In addition to considering care as an ethical intervention, Bellacasa also claims a relation between 'speculative' and 'ethics,' the 'speculative [...] connects to a feminist tradition for which this mode of thought about the possible is about provoking an ethical imagination in present' (Ibid., 7).

#### CHAPTER III – CULTIVATING CARE



FIGURE 28. Sunset from a tower close to the Dyne office February 2018



FIGURE 29. Sunset from a tower close to the Dyne office February 2018

I now wish to look more into the interventionist nature of Dowse and the speculative aspects of the box as it aims to ethically intervene into IoT, and in doing so also moving our ethical imagination in the words of Bellacasa. In the design guidelines for Dowse, practices of designing is referred to as the subversion of situations which mobilizes both the anticipated interventionist capacity and the more than human dimensions of Dowse:

To create a specific situation we must use a specific type of design. [...] Temples, fireplaces and TV tops, ceremonies, tables and chairs, tea cups. The design of the object is [...] the result of the coexistence of functions, forms and energies [...]. And an object can be planned explicitly to subvert a known situation if the occasion arises. (Dyne, Bonelli 2015, 4)

In this quote, design is situated within a universe of multiple forms and energies resembling the vivid ethical universe described by Bellacasa (2017). In these thoughts on what it means to design an object, the capacity of designed things to both create and subvert situations indicate the transformative and interventionist potential of artifacts such as the Dowse box. An example of how design plays a role in crafting whole ideologies of a society is brought forward, namely in the New Babylon project by Dutch artist Constant Nieuwenhuys (Dyne, Bonelli 2015, 4). This was a visionary architectural proposal for a utopian city and future society which Constant started developing in the 1950's (MACBA n.d.). This radical societal transformation entails both dystopian and utopian imaginaries (Gemeentemuseum n.d.), speaking to the ambiguity and uncertainty of IoT development indicated in Chapter I. Curiously, I have not only come across a reference to Constant's New Babylon project in the context of IoT and the ethical questions posed by these new technologies through Dyne. A Rotterdam-based architect involved with IoT contacted me during the first year of this PhD research, and during my fieldwork in the Netherlands he invited me to visit the New Babylon exhibition in Den Haag to illustrate that we are facing a paradigm shift with IoT raising ethical questions, just like Constant's future city conveys.

In the design guidelines for Dowse, the intentional capacity of the box to intervene with material environments and bring about radical transformation is directly expressed. This links back to Akrich's point about how a designed object embeds relations and is reciprocally situated within an environment (1992, 207), and to Bellacasa's thinking about how interventions are an integral part of care ethics and its material and speculative relational re-creations (2017, 6-7). This aspiration of Dowse is elaborated on below in reflections about the capacity of designed 'objects as transformators':

More radically, objects that encode in themselves situation design, envisions ways to transform situations by themselves. I call objects designed with these characters

in mind transformators. This is, in its simple terminological core, my approach to interface design, radically different from the simple mainstream idea that product design, placing and marketing, is the core of the job. I cherish this difference (Dyne, Bonelli 2015, 5).

A distinction is made between the design approach informing the creation of Dowse and what is referred to as more 'mainstream product design', a differentiation that is anchored in how the Dowse box is designed to transform situations. This active attempt to mark a separation from 'the mainstream' characterizes not just the design of Dowse, but springs from the social milieu surrounding the box. This is expressed in the presentation of Dyne earlier in this chapter and the prominence of 'tea', both in the Dyne office and in the Dowse design guidelines, acting as another manifestation of this. In several quotes the act of drinking tea is brought up as in the examples above from the design guidelines for the box, introducing how teacups can play a role in the design of objects and situations. The creators of the box compare 'the act of using dowse to grant access to our network to guests like to serve tea' (Dyne, Bonelli 2015, 7). As already indicated, a teapot with an ayurvedic tea blend is most often situated close to Jaromil in the Dyne office. Jaromil shares with me in an interview how 'no harm can happen when drinking ayurvedic tea' which he opposes to the up-beat tempo of drinking coffee in busy 'mainstream' working environments. Tea, in this sense, becomes a critical comment on both mainstream design and worklife, nourishing both the visions for Dowse and its creators on a daily basis.

This speaks to the mission of Dyne to critically engage with technological developments and the role they play in society. Acts of drinking tea, watching sunsets and the awareness exercises at the Dowse workshop invite us to slow down, to sense our surroundings, to become aware of what we care about. We see how Akrich's attention towards the reciprocal relation between technologies and the environments in which they come into being (Akrich 1992, 207) is a fruitful analytical gaze. Akrich's thinking allows me to articulate how the design scenarios for the box and its capacity to enhance our sensorial ability to ethically engage with IoT reflect central practices in the environment from which Dowse is born. A creational environment embracing sensory immersions into sunsets close to the office and awareness exercises when the box and its creators travel together.

A final step in my analysis of what characterizes the ethical enactment of IoT that the Dowse box is an example of leads us back to the Dowse workshop in Copenhagen where the creators of the box sought to open up our senses and caring attention towards IoT. In the beginning of this Chapter, I posed a question about what it takes to even be able to ethically respond to IoT. Through my analysis, I have shown that the Dowse box and its creators seek to make us care about IoT by making visible invisible operations of these technologies on our networks, enhancing our sensorial awareness towards a technological invisibility that in the field of ubicomp was imagined to liberate our attention (Gabrys 2016, 9; Inman and Ribes 2019, 4).
Bellacasa, through STS inspired ethnographer Wakana Suzuki (2015), brings up the expression 'an ethos of caring attention' to argue that an expansion of what we think with care about introduces 'new modes of attention' (2017, 10). This link between care and attention brings us back to how the Dowse box is challenging the visions of ubiquitous computing realized through the creation of IoT connective devices, seeking to make technologies disappear into the background of our existence and liberate our attention as a scarce resource. As already illustrated, the Dowse box attempts to bring back the invisible workings of IoT connective devices to our attention as it ethically intervenes into a world populated by these technologies. In making visible invisible IoT operations on our networks, the box cultivates conditions for us to care about IoT as an ethical intervention into the phenomena.

As indicated earlier in this chapter, similarly to the Dowse box and its creators, Ballestero engages with 'the hidden' with an empirical point of departure in subterranean space and water worlds (2019, 1). Though Ballestero does not explicitly deal with the question of ethics in her study, her thinking offers a comparative ground for discussing what characterizes the kind of ethical intervention that Dowse is a case of. In Ballestero's study, she implicitly with reference to both Bellacasa (2017) and geographer Kathryn Yusoff (2013) mobilizes questions of ethics in more than human worlds that are relevant for the enactment of ethics and IoT in this empirical instantiation of the phenomenon. Echoing a point by Bellacasa about the cultivation of 'new modes of attention' for what we think with care about (2017, 10), Ballestero in her study of hidden worlds, inspired by Yosuff (2013), brings up a question about how to enhance our attention to new spheres (2019, 3). A gesture which Yosuff links to an 'ethicopolitical question of sense' (2013, 209). In Yosuff's work on 'insensible worlds' and 'postrelational ethics,' she brings forward a quote from Guattari about how 'an ecology of the virtual is just as pressing as ecologies of the visible world' (Guattari 1995, 91 in Yosuff 2013, 213). According to Yosuff, if we are to 'create new spheres of attention for new kinds of phenomena' and to 'create new practices of sensations and new sensibilities' around diffuse issues such as climate change, we must seek to understand 'the insensible dimensions of our material ecological arrangements' (2013, 213).

Fostering new sensibilities and spheres of attention lies at the heart of the way in which the Dowse Box ethically intervenes into IoT by making visible the invisible. As Yosuff makes a link between that which is insensible and ethics, inspired by feminist theorist Karen Barad she brings up 'the question of "enabling responsiveness" (Barad 2010, 265 in Yousuff 2013, 208), which according to Yosuff introduces a relation between ethics, politics and sense (2013, 209). Yosuff sees this relation as especially pressing when we face 'immaterial dimensions of matter' and asks, how are we to be responsible for instance towards 'that which disappears without trace'? (Ibid.). Yosuff here introduces a question about responsibility in her thinking about ethics which is echoed in the work of Bellacasa which I will explore in Chapter V (2017, 43).

What I wish to illuminate in this chapter with these perspectives is a different point. As mentioned, Bellacasa brings forward how a range of 'ethical concerns [are] raised by our proximity and involvement with the material effects of our thoughts' (2017, 17). Dowse ethically intervenes into a world increasingly populated by IoT technologies that materially embody ubicomp ideals about technological disappearance. Articulated through the thinking of Yosuff above, the box ensures that traces of IoT technologies do not disappear as Dowse counteracts the liberation of our attention towards these creations and their workings. The Dowse box turns ubicomp ideals upside down as it ethically intervenes into IoT. In the next and final part of this chapter I will sum up my main analytical points.

### Conclusion

In the beginning of this chapter I posed the question: what does it take to even be able to ethically respond to IoT? I asked this because it lies at the heart of the ethical intervention into ethics and IoT that Dowse represents. My overall argument is that this box seeks to create conditions for us to care about IoT as an ethical intervention into these technologies that makes visible their invisible operations on our networks.

I have empirically illuminated how the creators of Dowse believe that caring is an important foundation for the purpose of the box which is 'in first place ethical' (Dyne 2017, 8). Drawing on theoretical inspiration from Bellacasa (2017) arguing for a close relation between ethics and care, I have illustrated through my analysis that a range of material practices are part of turning IoT into a matter of care through the creation of a box such as Dowse. According to Bellacasa, ethics must be considered as a hands-on process that reaches beyond the human rather than as a list of moral principles and an 'ethics of care' entails material practices that re-creates relations (Ibid., 4;6;22). I analytically combined this thinking of Bellacasa about how care is materially inscribed in things (Ibid., 18) with Akrich's point, that technological artifacts embody heterogeneous relations, scripts from their designers, and are influenced by the environments in which they come into being (1992, 206-208). I did so to illuminate how the Dowse box embodies a range of material practices, visions and relations that are part of its ethical mission to make us care about ethics in IoT by critically intervening with their invisible qualities.

Interventionist and speculative qualities are a central part of caring (Bellacasa 2017, 6), and I have shown how the Dowse box opens up for a re-creation of our relationship to IoT by enhancing our ability to ethically respond to these technologies. As the box intervenes into a more than human universe increasingly populated by things invisibly communicating on our networks it counteracts design virtues in ubicomp about technological seamlessness (Inman and Ribes 2019, 1). Dowse asks us to pay attention to what has been made invisible to us in the development of computing, enabling us to materialize

the invisible operations of connected things. This echoes a commitment in STS inspired studies of infrastructure 'to making it visible' and able to be 'remarked upon' (Winthereik et al. 2019, 352). Through the thinking of Yosuff, I have illuminated how ethics speaks to questions about both sensorial and attentional enhancement towards the materiality of what we cannot sense in order to remain responsible towards 'that which disappears without trace' (2013, 209).

Through participation in awareness exercises in the Dowse workshop at ITU during the Fall of 2017, and through the act of watching sunsets from a tower in the Amsterdam harbour zone hosting the Dyne office in the Spring of 2018, I have been exposed to practices intended to enhance my sensorial engagement in the world surrounding me. A more than human universe increasingly populated by IoT in invisible ways. As the Dowse box ethically intervenes into this world of IoT by making these technologies visible to us in new ways, it materially intends to cultivate conditions for us to care about connected things among us. As my analysis shows, this enactment of ethics is rather different than an ethical intervention into IoT in the form of a written document such as the IoT-EG's fact sheet on ethics and IoT, as the Dowse box both entails yet moves beyond purely words. Through a capacity to visualize the invisible workings of IoT technologies, the box actively takes part in opening up for an ability to respond to and care about ethical matters at stake in IoT development rather than solely focusing on conceptually defining them.

In the following chapter I analyze the third and final ethical intervention into IoT in this dissertation; an enactment of ethics and IoT in the shape of events across European borders, hosted by the ThingsCon community where both representatives of the IoT-EG and Dyne participate. As I will show, this third empirical instantiation of ethics and IoT differs from the two analyzed cases because it takes the shape of events where form and content fold into one another as numerous actors from various parts of Europe gather around *things*.

# CHAPTER IV

## **Extraordinary Ethics**

We now return to the wedding district of Berlin and the opening of the dissertation in August 2019 where I am interviewing an educated computer engineer who, in his own words, has spent a good portion of his 33 years working on connected devices. As brought forward in the introduction, the interviewee, Gabriel, describes himself as a 'disillusioned IoT Architect' to me at a ThingsCon Salon in May 2019, elaborating on how his sense of disillusionment ties into a personal realization. A revelation about how IoT and technologies more broadly is not 'necessarily a force for good,' as he puts it. Throughout our interview, an ethical unease springing from taking part in the creation of new IoT connective devices is brought forward. In the following quote, Gabriel shares with me how he responds to this realization about how a positive contribution to the world is no longer an intrinsic part of IoT technology creation. Gabriel does so by questioning and anticipating how a given technology might be used not just for 'good', but also for 'bad':

So I started doing what everyone should do when they build technology companies and saying, ok, this is what I think a technology can do being used for good, but how can this be used for bad? And after six or seven goes at it - I think this is something interesting that I want to build - and finding out that - yes, in this very narrow circumstance it could be used for good, but more than likely the technology will end up being used to make people's lives worse - I said, look, ok, it's irresponsible to bring connected consumer devices to market in the current market. Because either you make the devices respectful of peoples' privacy and security and stuff like that and then you fail on the market because it costs three times as much and you don't have any compelling service on top, or you build in all of these sort of dark patterns and subscription models and you take ownership further away from people. And you do all these things that are pretty much terrible for society, and then maybe you have a chance of going bankrupt or being sold to a bigger company after 2-5 years.

Gabriel describes how it is a challenge to both succeed on the market and respect peoples' privacy when making new IoT devices. His reflections embrace matters of creation, responsibility, dark patterns, respect, 'good,' 'bad,' cost, service, ownership, bankruptcy, business models and the current market. All societal foundations and implications of the

development of IoT combine with Gabriel's sensation of being a disillusioned IoT architect. Gabriel goes on to explain how he does not want to be living as a 60 or 70 year-old in a world full of devices that have been created in the path of disrespectful ways that he has brought forward. 'So what do you do? Well, you stop building them. And you stop building them for people. Go do other things,' Gabriel states.

However, Gabriel does not disengage with the development of IoT. Quite on the contrary. Even though Gabriel describes his increasing questioning of the inherent goodness in technology creation over the course of ten years as a personal tale, Gabriel does not stand alone in his worries about the development of IoT connective devices. At various events across Europe, public gatherings attending to the unease introduced by Gabriel spring up. The first time I met Gabriel was at such an event at a conference hosted by ThingsCon in Amsterdam 2017 where Gabriel was giving a talk at a session about IoT and security. As presented in the introduction and in Chapter I, ThingsCon is a prominent community for IoT practitioners that I have been particularly involved with more consistently during the course of fieldwork from March 2017 to September 2019. Since its beginning in Berlin around 2014, ThingsCon has created multiple venues for bringing together IoT practitioners in Europe and increasingly beyond to talk about THINGS, as a slide in Chapter I states in capital letters at the yearly ThingsCon conference in Rotterdam 2018. The ThingsCon community seeks to promote ethical and responsible practices in IoT (ThingsCon 2020), reflecting upon what this means in the 21st century: 'since its inception ThingsCon has been an on- and offline environment providing a place to discuss issues within this space needed to be addressed and why' (ThingsCon 2018).

As this quote reflects, ThingsCon is a community, opening up for a space both on- and offline to reflect upon issues related to IoT with a focus on ethical and responsible aspects. ThingsCon is the focus point of this chapter, where threads will weave in and out of this community as I seek to explore and lay out what characterizes this third ethical enactment of IoT in the form of ThingsCon events.

The case of Gabriel introducing this chapter at first sight invites an analysis inspired by the 'ordinary ethics' approach prominent within the 'ethical turn' in the field of anthropology. This approach is inspired by philosopher Michel Foucault's (1986 [1984]) work on self-cultivation and ethics as an everyday practice (Faubion 2011; Laidlaw 2014; 2017; Lambek 2010; Mattingly 2012; Fassin 2014). If I go down this analytical path, I will bring forward the numerous voices that echo Gabriel, painting a picture of their ethical worries and how they deal with them in action to "do good" and cultivate themselves as virtuous beings. I will partially apply this analytical gaze, as it is relevant to expose what characterizes the ethical intervention into IoT that ThingsCon events represent.

Nevertheless, the response from Gabriel to the current situation that he finds himself in also reaches beyond his individual sense of ethical unease and how he tackles this. Gabriel moves into a public and eventful community in the shape of ThingsCon where he participates and actively takes part in creating what I will call an *extraordinary* space for ethics, from which to deal with what he is experiencing together with others having similar experiences. I wish to show how the event spaces mobilized through ThingsCon challenges an approach to ethics as entailing all our practices on an ongoing everyday basis, unfolding ordinarily at a steady pace. In the empirical examples that I bring forward in this chapter, the enactment of ethics involves a temporary intensity for ethical engagement, carefully designed and arranged extraordinarily.

As I will introduce shortly, anthropologist Jarett Zigon's work on what he refers to as the 'moral breakdown,' and an ethical demand to act and 'keep on going' (2007, 138) sets the scene for the forthcoming analysis. It will, however, not serve as my only theoretical source of inspiration to analytically illuminate how active efforts are made in the ThingsCon community to create a space for ethics and IoT. In order to explore this more in depth, I will mainly draw on two sources of theorizing. My inspiration is drawn from what anthropologist Rachel Douglas-Jones articulates in the attempt of 'making room for ethics' (2017), and the materiality of public participation introduced by STS scholar Noortje Marres and anthropologist Javier Lezaun (2011). I will unfold their thinking brought forward in the respective studies in more detail later on in the chapter. What I want to highlight now is that the chosen theoretical sources address the material practices involved in making room for ethics (Douglas-Jones 2017) and of participatory publics (Marres and Lezaun 2011) in ways that allow me to shed light on what it takes to deliberately design of a space for ethics in the context of IoT at ThingsCon events. This is a different analytical gaze than one merely directed towards content and discourses at public ThingsCon events, though these are also interesting thematics that will weave in and out of my analysis. These chosen theoretical tools additionally open up for a move beyond regarding ethical interventions as practices of self-cultivation, directing my attention towards deliberate efforts to create space for ethics collectively and beyond the human.

I will first unfold more in-depth what kind of initiative ThingsCon is and what characterizes this community from the perspective of participants and founders. I will then move on to illustrate how various individuals as well as organizations involved with IoT and ethical matters brought about by these technologies combine with the ThingsCon community such as IoT manifesto authors, a member from the IoT-EG ethics subgroup and the creators of Dowse from Dyne. After examining extracts of empirical accounts about why ThingsCon participants attend these events, I will move on to analyze what characterizes the enactment of ethics and IoT in the shape of ThingsCon events that are carefully designed for this purpose. As I do so, I notice the material practices carried out to carve out a territory for ethics that I argue is extraordinary. This leads me to a final section describing a desire for change and impact running through ThingsCon initiatives and participation in these. Before looking into who participates in ThingsCon and why, I will in the next part of this chapter ask: what kind of community is ThingsCon from the point of view of its founders? How is it organized? What is it trying to do? What are the challenges in IoT? And what has motivated the initiation of engagements ranging from different events to publications?

## **THINGSCON: Ethical Publics across Europe**

On the official ThingsCon webpage the initiative is described as follows:

ThingsCon is a global initiative to explore and promote the development of fair, responsible, and human-centric technologies for the IoT and beyond. We organize events, and create resources and tools for a diverse community of practitioners to promote ethical, considerate, responsible and human-centric practices across IoT, artificial intelligence, machine learning and related technology with a human impact (ThingsCon n.d.).

ThingsCon is a global community organizing events to explore and promote ethical IoT, whilst aiming to provide resources for a diverse community of IoT practitioners to support them in their practices. ThingsCon at the moment has a core team of seven members of the community from different countries within Europe (ThingsCon n.d.*a*). The community is particularly active in the Netherlands and Germany with recurrent events in Amsterdam, Rotterdam, and Berlin and occasional events in Den Hague, Darmstadt, Eindhoven, Antwerp and Cologne. The community is nevertheless not confined to these sites as events have also serendipitously played out in Brussels (February 2016), Lisbon (May 2016), Vienna (July 2016), London (October 2016), Milan (April 2017), and Copenhagen (September 2017). ThingsCon events have also occasionally been arranged in geographic spheres beyond Europe, such as in Rio de Janeiro (August 2016), Belém (August 2016), Shenzhen (April 2017), Shanghai (October 2017), Nairobi (December 2017), and Denver (November 2019).

In an interview with one of the ThingsCon founders, Alexander, he shares with me how the seeds to ThingsCon were planted in 2013 as a response to an 'in-between' space of IoT practitioners that did not seem represented at the time. I ask him to tell me about the beginning of ThingsCon:

It was late in 2013 and we were wondering how to learn more about the aspects of IoT that interested us most which was not the super industrial IoT part that was well-catered to even at the time, but that was also not just the hobbyist DIY tinker part that was also catered well to. But in between there was a big, big field of practitioners entering that space. And I just wondered where to learn more about this, where to meet all these people, and we literally could not find any events neither in Europe, nor in The States.

As Alexander describes, ThingsCon started in 2013 in response to a lack of events both in Europe and The States. Thingscon targets IoT practitioners operating in what he refers to as a field between 'super industrial IoT' and the 'hobbyist DIY' IoT scene embracing maker and hacker communities. As Alexander puts it, he wondered where he could 'meet all these people,' yet again emphasizing the centrality of coming together around IoT as a central aspect of ThingsCon intended to cultivate a community that was not catered to at the time.

The number of events organized by and through ThingsCon vary quite widely each year from 7-19 and primarily include smaller gatherings such as *salons* (duration 2-3 hours) throughout the year as well as larger *conferences* (duration 2-3 days) on a yearly basis. As presented in the introduction, through my fieldwork over the course of three years I have had a chance to participate in six ThingsCon events; three salons (Berlin 2017, Copenhagen 2017, Rotterdam 2019), two conferences (Amsterdam 2017, Rotterdam 2018), and an *un*conference (Berlin 2019). I have focused on fieldwork in the sites where ThingsCon is particularly active including Amsterdam and Rotterdam (January 2018 – April 2018) as well as Berlin (May 2019 – August 2019). My participation has taken different forms in addition to participating in various events, including co-hosting a ThingsCon Salon in Copenhagen (September 2017) and presenting at a ThingsCon Salon in Berlin (May 2019).

In the following section two ThingsCon founders describe what kind of community ThingsCon is to them. The ThingsCon core team embraces various professions and experiences. Alexander holds a double major in political science and communication sciences while David, who you will encounter in the following section, holds a bachelor and master in psychology.

## From Curiosity to Concern

During a range of interviews I ask the founders of ThingsCon: what is ThingsCon? And who does ThingsCon exist for? One of the founders, David, describes how 'it's a network of people and a series of events that try to take a critical look at emerging technology.' Another founder, Alexander, in his response to my question indicates that ThingsCon has changed since its first inception:

Me: How would you describe ThingsCon? Alexander: Today?

Alexander's response indicates that ThingsCon has changed since the community was initiated. He goes on to share with me how a descriptive framing of ThingsCon is something that the core team continuously discuss:

That's one of the questions we struggle with all the time where we like, need to frame and reframe this all the time. I would say 'it's a group of practitioners in IoT that advocates for responsible and fair practices'. Like how can we make these things work for the people who use devices rather than just the vendors.

Alexander tells me a bit more about the development of ThingsCon where various interests have moved the community in different directions, but with a really big group attending to the 'social implications of IoT':

...that we found to be a really strong core in that community. So organically that's kind of where everything coalesced, and that's kind of what defines ThingsCon. It was not by design as much as more of like, a discovery process.

This leads us back to Alexander's narration of how the seeds to ThingsCon were planted in 2013 as a response to an in-between space of IoT practitioners that did not appear to be represented at the time. In the following quote, Alexander elaborates on how his wonder and curiosity communally turned into a sensitivity toward ethical and responsible technology:

It really started first with just wanting to learn more about that scene [...]. I think that worked as an event format pretty well so we did that for a couple of years. And then within like the first year or two we found that there is like really a common voice in the ThingsCon community that took that angle of ethical or responsible technology rather than just making things happen faster or more cost efficiently or scale better.

This quote reflects a change in the ThingsCon community from a broader curiosity around IoT technologies to a more focused attention towards ethical or responsible aspects. This tale about the development of ThingsCon resonates across various members of the ThingsCon core team pointing to an important change quite early on in this community and its initiatives. David, for instance, reflects upon a question that I ask him about his motivation to be part of ThingsCon where he, similarly to Alexander, expresses an aim to 'provide an environment' as an initial interest:

Good question. I think [back] then we thought that hardware was kind of new at the moment. I mean it wasn't that new, but there wasn't that much around... It was like tinkering conferences and events in Berlin, but it wasn't like a real kind of conference. And we thought that we could perhaps provide this kind of environment and see what new things can be done with hardware. And it wasn't specifically about IoT in that moment, and it also didn't have this kind of critical perspective that I think ThingsCon has now. The first edition was more like: 'hey we can do new stuff with it'. And I was interested in like, the new kind of solutions that could be built for societal problems. I didn't have it more concrete... I thought like, a way of showcasing this and providing an environment where one could learn to...kind of how to do that. That's how it started. And then it changed.

I ask David if he remembers what brought about the change:

So, the first event was still a little bit, 'yeah, everything is great', as I said, but I think it's people that we met there like the Dutch crew, Lucas and Noah, and perhaps also just the...I think that the discussions we had started to change, we perhaps started to become aware of that 'perhaps not everything is gonna be rosy with all of this.'

David brings up an example of an IoT technology causing suspicion that was showcased at the first Dutch conference.

And I wasn't so sure: is he joking? Cause this is terrible. And I remember that was a moment for me, like: ok this was not kind of like 'the yay' that I had hoped for... This is actually kind of shitty. And then the people that we invited for the second conference [mentions different people] and the IoT Design Manifesto - it became much more like: this can go seriously wrong and we are gonna have to be more careful than in a celebratory mood. So that's kind of how things changed, I think. [...] Perhaps from looking at hardware and IoT and the cool things that can be done with it to this critical look at everything that could be wrong and kind of the role of perhaps designers who want to make it right.

David here brings up the arrival of a 'Dutch crew' embracing authors of the IoT Design Manifesto (2015) as a crucial moment for the changes brought about in the community, an arrival from the Netherlands which Alexander also remembers vividly:

The first year at ThingsCon this whole delegation from Rotterdam showed up that we also barely knew at the time and they just brought like [hosts] from Amsterdam as well and that's kind of amazing. And today all these people who showed up there the first time, they are part of the core ThingsCon team and organizing all these things together. They host the big annual conference right now and that's really awesome.

Both Alexander and David describe a change in ThingsCon quite early on in the history of the community from the first event where the tonality was 'yeah, everything is great,' as David puts it, to an increasing sense of unease and attention towards what might go wrong in the development of IoT. Interestingly for the analysis in this chapter, David similarly to Alexander describes ThingsCon events as an endeavor to create a certain environment missing at the time when ThingsCon was initiated. David additionally brings up the theme of 'designers who want to make it right' which leads us back to the cases opening up this chapter and the question of how to alter the current course of IoT development.

In the following, I wish to expand on the expansion of the ThingsCon community with the arrival of a crew from another part of Europe compared to where the first ThingsCon

seeds were planted. ThingsCon participants now move across numerous European borders to gather and discuss. Who participates in ThingsCon and why? How did I come to understand what ThingsCon is from the point of view of its members? I will now move on to a second section of this chapter focusing on who participates in the ThingsCon community and their incentives to do so.

#### 'Does anyone else feel this way too?'

I now wish to return to the opening vignette and bring forward another story resonating with Gabriel's from a participant who I met approximately a year after at a ThingsCon Conference in Rotterdam 2018. The forthcoming reflections spring from Nathan who, similarly to Gabriel, responds to a personal unrest tied to the creation of IoT technologies by attending various events such as ThingsCon initiatives. Nathan, who I met at a Things-Con conference in Rotterdam 2018 where he was running a workshop on designing out waste in IoT, describes himself as 'a climate focused technologist.' In an interview that also takes place in Berlin the summer of 2019, Nathan shares with me what he believes are some of the qualities of event spaces such as ThingsCon. In the following extract from my interview with Nathan he clearly brings forward how problems and questions puzzling him as an individual turn into collective ones as he wonders, 'does anyone else feel this way too?'

I think...so I guess, on one level I have kind of selfish reasons for doing a lot of this stuff because I'm trying to figure out myself, and I'm trying to like live a good life and address all of these kind of horrifying hypocrisies that we end up being forced into with like the climate and like the framework we're living in, right. So I'm trying to figure this stuff out. But I think the thing that I'm trying to follow in many cases is... I kind of feel that the problems I have... Or, it turns out that one way to address this stuff is: does anyone else feel this way too?

And I think that's the thing that I suppose I find most useful because I think a lot of us do do that. And I think when people are working in the way we are currently employed we're not able...it's difficult to have these conversations, and a lot of us don't know how to have these conversations without it either being a kind of accusatory thing, or kind of about us being able to move beyond 'oh my god isn't everything terrible', 'aren't we in a scifi', and say: well, ok, we've acknowledged that we're in a scifi. If we want to not be in a scifi what things could we do to not do that. It feels like that part is something that lots of people...they're just so tired or emotionally exhausted that they don't know...it's like they don't know how to do that, they don't know what they're doing or they don't know how they...you need like other peoples' energy or other peoples' emotional energy to actually work through some of that stuff. Because a lot of it is really hard and really scary and really tiring and it's much easier with other people to make you realize that it's not just you struggling with this stuff. Yeah, I guess that's the thing. [...] Because I find it really really hard and this is my...events, is basically my coping strategy.

Nathan goes on to elaborate on why it is emotionally exhausting to work through some of the scary 'stuff' of IoT:

Because it brings up all these questions like if these are true what does it say about me as a person, right? And in many cases the answers about what this says about me as a person are not answers that I feel comfortable with. [...] One way to address it is to just ignore it, ok, it's not there. And as an English person I'm very very good at ignoring or not talking about things, right? Or like, lightly ignoring stuff. But it feels like certain things you can ignore until they go away. But other things you cannot ignore until they go away. And it feels like when you have that scenario [...], if it's not going to go away, then it's only going to get worse over time. So as uncomfortable as it is to talk about this now, it's going to be even more uncomfortable to have these conversations in ten years time when the people who are younger than us will say: well, what did you do when you had that chance? So yeah, this is the least uncomfortable approach that I am aware of right now.

Nathan, like Gabriel, brings up a moment in the future where present actions or a lack thereof will have implications for the role that technologies such as IoT play in our world. Neither Nathan nor Gabriel want to look back in time from a dreaded technological future that they already now anticipate without having done something in the present to alter the course of IoT development. Gabriel suggests that one way to respond to an unease around the goodness in new IoT creations is to simply 'stop building them.' These restrictive actions are not Gabriel's only response to the current situation that he finds himself in and he is not stepping out of IoT completely. Rather, he finds himself participating in events such as those hosted by ThingsCon where he shares his insights on matters of, for instance, IoT and security with others while also gaining access to their knowledge, concerns and experiences with these emergent technologies.

Nathan explicitly expresses that he finds the current state of tech creation really hard, scary and exhausting, not least in the wake of climate change. He describes events as his 'coping strategy,' a place where he can access what he refers to as other peoples' 'emotional energy' and realize that others are struggling with similar questions and issues. Nathan shares with me a discomfort with what 'horrifying hypocrisies' unfolding on a societal scale says about him as a person, stating that he wants to move beyond the realization that everything is terrible and focus on an imperative to act, that 'if we want to not be in a Sci-Fi, what things could we do to not do that?'.

In the cases of Gabriel and Nathan, an individual experience of ethical unrest moves them into collectives where similar sensations are shared. An increasing number of actors engaged with IoT development across Europe seem to be experiencing what one might in the words of Zigon call *a moral breakdown* (2007). I will return to Zigon's thinking briefly presented in the introduction of this dissertation as it assists me in articulating the

unease about the current state of IoT development that moves Gabriel, Nathan and others into the collective space for ethics that ThingsCon provides.

## A Moral Breakdown and the Ethical Demand to 'Keep Going!'

As mentioned in the introduction, Zigon (2007) argues that ethics manifests and plays out in moments of what he conceptualizes as a 'moral breakdown'. In their study of ethics owners in Silicon Valley presented in the introduction, Jacob Metcalf et al. draw on the work of Zigon to address how an approach to ethics as an ordinary practice might fall short in regards to illuminating the ethical as it manifests in desire for change in the tech industry (2019, 456). This longing for change manifests in different ways by the voices from within ThingsCon introduced above. Zigon describes how 'on occasion, something breaks down' (2007, 137). In what Zigon conceptualizes as the moral breakdown, one is shaken 'out of the everydayness of being moral' (Ibid., 133):

It is a freedom that allows ethics. Thus, it is the moral breakdown, or the moment of problematization, that I call the ethical moment. This is the moment in which ethics must be performed. In this way, then, I make a distinction between morality as the unreflective mode of being-in-the-world and ethics as a tactic performed in the moment of the breakdown of the ethical dilemma (Ibid., 137).

Zigon goes on to argue that ethics is performed exactly in such moments of moral breakdown and why they call for our analytical attention (Ibid., 137-138). Zigon suggests that we look into these 'social and personal moments when persons or groups of persons are forced to step-away from their unreflective everydayness and think-through, figure out, work on themselves and respond to certain ethical dilemmas, troubles or problems' (Ibid., 140). These reflections of Zigon's indicate a collectivity to moral breakdowns and ethical work of relevance for analyzing the ethical enactment of IoT in the shape of ThingsCon events. Participants gather in a space designed beyond their everyday practices to discuss ethics and IoT responding to their sense of ethical unease.

Briefly put, Zigon separates 'unreflective moral dispositions of everyday life and the conscious ethical tactics performed in the ethical moment' (Ibid., 148). Zigon is inspired by the Danish theologian and moral philosopher Knud Ejler Løgstrup (1997) to argue that with the 'ethical moment' comes an 'ethical demand' that is situationally placed upon you (2007, 138). One can never:

...be sure how the response to an ethical demand will turn out. There is always a risk in performing ethics. But yet, one must act. One must respond to the ethical demand, for one cannot live [...] in a permanent state of moral breakdown (Ibid., 139).

Zigon similarly with reference to philosopher Alain Badiou brings forward the mantra 'Keep Going!' as an important component of ethics (2001, 52 in Zigon 2007, 139). When faced with ethical moments and events, one must connect to a motivation and respond to

get through them, 'I suggest that the main motivation for responding to the ethical demand is to get out of the breakdown' (Zigon 2007, 139). Inspired by the thinking of Zigon, some pressing questions to ask, departing from the situations that Gabriel, Nathan and many other ThingsCon participants find themselves in, are: what actions are taken when faced with a moral breakdown in the case of IoT? What do responses to the sense of disillusionment that Gabriel feels or the emotional exhaustion that Nathan faces look like in practice moving beyond statements and stances? In what ways do moral breakdowns move them into action? What ethical demands are placed upon them? How do they 'keep going'? If ethics through the thinking of Zigon can be seen as a tactical response to a moral breakdown driven by an imperative to act and move out of this state, then what are the tactical wishes expressed in the kind of ethics enacted through ThingsCon engagements? What is the purpose of it all?

Zigon leads us through his thinking on the relation between finding oneself in a moment of moral breakdown and an incentive to perform ethics in order to overcome this (2007, 140). Zigon additionally points our attention to how his approach to ethics can be mobilized both on an individual level and on the scale of a social group (Ibid., 140). This point and Zigon's thinking more broadly adds a relevant dimension to my analysis. I now illuminate how the unease experienced by individuals in their ordinary practices are brought into a collective public space, carefully designed to house a sharing of concerns centered around IoT creation. Who participates in ThingsCon events and what brings them to these gatherings?

#### Coping With an Individual Sense of Unease Together

One can be engaged with ThingsCon in numerous ways, I quickly learned as I continued to immerse myself in this diverse network of IoT practitioners. The actors making up this community embrace founders, participants, hosts, speakers, IoT technologies, prototypes and more. A more than human gathering moving across disciplinary boundaries and professions. As the ThingsCon community facilitates a range of initiatives, including different events to explore what ethical and responsible IoT might mean (ThingsCon 2020), a variety of bodies within IoT development come together. This is for instance reflected in the programs for the ThingsCon Conferences in Amsterdam (2017) and Rotterdam (2018), drawing a picture of the diversity of IoT engagement represented at these events. Some of the supporting partners at the ThingsCon 2018 conference embrace a large telecommunications company such as T Mobile, and a digital consultancy such as info.nl based in Amsterdam or the AI company Snips springing from Paris. The Things Network is furthermore a recurrent participant that, as indicated briefly in Chapter I, engages with what might be an ideal network for IoT focusing on questions about locality, community and energy. As a final example, academia is also represented through for instance an explicit affiliation with TU Delft.

Returning to the voices of Gabriel and Nathan I have sought to better understand why ThingsCon participants across modes of engagement are attracted to and attend these events. As revealed, I met Nathan for the first time at the ThingsCon Conference in 2018 taking place in Rotterdam where he together with an industrial designer, Yvonne, ran a workshop entitled 'Intro to designing out waste.' I was participating in this workshop taking place in parallel with several others, and as revealed on the photography below I was joined by eight participants. In May 2019 Nathan and Yvonne presented at a ThingsCon Salon in Berlin where I was one of the speakers. Here they followed on from the topic from the ThingsCon 2018 conference by giving a talk framed by the theme of this salon: 'Ethics and the lifecycles of IoT'.



FIGURE 30. Workshop - 'Intro to designing out waste' at an event in Rotterdam 2018 (ThingsCon 2018d)



FIGURE 31. Workshop - 'Intro to designing out waste' at an event in Rotterdam 2018

Above are two pictures from the workshop where I, together with other participants in the ThingsCon conference, tried to think through the development chain of an IoT technology through the lens of its environmental impacts in regard to *MET: Materials, Energy, Toxicity*. Nathan and Yvonne, who had actively decided to enter the ThingsCon community and the field of IoT, were both based in Berlin when I met them in Rotterdam. Nathan explains to me how participating in events such as ThingsCon is his coping strategy to deal with his concerns about a range of issues, especially about matters of technological development and climate change. During an interview with Nathan's partner in crime, I ask Yvonne about what made her interested in participating in the Things-Con Conference in Rotterdam 2018 where she first jokingly states that 'Nathan dragged me into it, so I'm gonna just blame it on him.' Elaborating in more detail on how Nathan's initiative unfolded, Yvonne explains that:

Basically, what I was interested in... We talked, me and Nathan, about these tools that I had been teaching for design students of life cycle analysis [...] and information on the environmental impact of a product. He said that he would love to get the people - the IT crowd, or the internet of things crowd - more interested in this. So we came up with the idea of setting up the workshop. So we did a combination with the idea of thinking that I would present the environmental impact of the hardware and that he is knowledgeable about the environmental impact of the software and the kind of IT side of things.

As Yvonne describes, the motivation to run a workshop at the ThingsCon 2018 conference in Rotterdam was to get 'the internet of things crowd' more interested in questions of lifecycle analysis and environmental impacts of products. Two topics that Yvonne and Nathan work with from different points of departure that compliment one another because they can address both dimensions of hardware and software whilst working together in IoT technologies as unfolded in Chapter I. In line with Nathan's search for others who 'feel this way too,' a maker and engineer running IoT meetups in Zurich, Tim, during an interview tells me about his motivation for participating in ThingsCon initiatives. Tim shares that a positive aspect of being part of ThingsCon events is about getting involved with a network of people who you can ask about specific topics. A confirmation that other people are working in the same ways, he explains, that they are 'working at the edge of technology,' as he puts it.

These thoughts resonate with the following from Roy, a ThingsCon participant who I interviewed in the fall of 2019. Roy describes to me how he started as a visitor of the conferences and the events in this community about four-five years ago. Roy works within the field of design and runs an invention studio for what he refers to as 'smart' and 'well-behaved products.' Recently, Roy started taking on a more active role in the Things-Con community not merely in regards to attending events, but also in their very organization where he, among other initiatives, ran a ThingsCon salon on resurrection which I will return to. What I wish to bring forward now are his thoughts on what kind of space is created at ThingsCon events and why this is needed. His response to this question is very much about the people participating in the community and why they choose to do so:

I think the main thing that is needed - or at least that seems to happen at every event - is that people come together who have a shared interest in a certain topic and have been thinking about this in some time and don't have so many people around them that are on a maybe similar level in thinking about the solutions, what they could be, how the technology works, but also what the potential consequences can be of certain developments or certain technologies or certain applications of technologies. So I think it's mainly that since we are here, that ThingsCon is already here now for 6 years, people, at least those people, seem to be able to find us and find our events. And they find you could say similar minded people or at least people with the same interests and passions or time. Same interest that they have in part of this big world that's called IoT and the consequences of making these things. So it's mainly the people, I think.

Roy here brings up how shared interests bring people together in the ThingsCon community. That people who are reflecting on both consequences of the world they take part in creating and the solutions to some of the problems faced 'in this big world that's called IoT,' and can meet up with 'similar minded people.' He adds that some perhaps do not 'have so many people around them' who consider the consequences of IoT. Roy continues, that somehow these people 'seem to be able to find us and our events,' replicating Nathan's overarching question that sparked his search for and nourishing his interest in joining a community such as ThingsCon, 'does anyone else feel this way too?'. Roy goes on to describe how a certain quality of event spaces created through the ThingsCon community taps into questions of energy and about reenergizing beliefs, also echoing the reflections from Nathan about how one needs other peoples' energy to work through emotional exhaustion from the current conditions in IoT. According to Nathan, it is easier to work through this if one gets a sense of how you are not the only one struggling which resonates with Roy's thinking below:

It's just that people want to...in this event or short amount of space lots of things get discussed, lots of energy is there and maybe it's for some people - especially people who are thinking about this all year long - it's like also a way of reenergizing maybe their beliefs or their like...the thing that makes them work in this field or at least willing to be part of this community. So it's like a...it gives some energy to stick with it and I have the feeling that they are maybe not alone or not like, yeah, there are more people who share their view on these developments and on the possibilities of IoT.

Roy brings up how the event space of ThingsCon extraordinarily embodies lots of energy with a capacity to reenergize the beliefs of participants. These events remind them that they are not alone with their sense of unease around IoT development manifesting on an individual level in ordinary everyday settings. Describing who participates in the ThingsCon community, Roy points to the diverse participation of people who are 'creating Internet of Things products and services, or who are in their day to day work researching it from an academic standpoint, or who are thinking about regulation and governance of these kinds of things.' This description reflects the heterogeneity of the ThingsCon community. Similarly to Nadia below, Roy however highlights a strong representation of academia sharing with me that he would like to see even more people who work at the companies who produce IoT products.

Nadia is a London based designer with an educational background in both industrial and interaction design. During an interview in the fall of 2019, she explains to me how through her consultancy work in the space of IoT across energy, banking and insurance sectors she has 'met quite a lot of people and have been aware of quite a lot of problems.' Echoing the numerous voices above, Nadia expresses a wish to articulate the problems that she as an individual has encountered during her work. Asked about what positive influence a community such as ThingsCon might bring about she responds the following:

I mean the pros are obviously the usual pros which is that people might approach the design phase differently, they might - and you would freakin' hope that that would be the case from the ThingsCon community - that they might learn about IoT differently in an academic context. Because so many people around ThingsCon are academics, so you hope that these are kind of happy by-products. And again, you know, minting just general population literacy around these issues I think is always a good thing.

Nadia suggests how people might learn differently about IoT through the ThingsCon community and approach design phases in altered ways as a potentially positive impact of the community. As a response to a question of mine regarding her motivation for participating in ThingsCon she explains how she as a reaction to the problems she has encountered in the context of IoT believes that:

I think the best we can do, I think, is to make some noise. [...] So, you know, I think the things that we have done over the past 5 years have been mostly about increasing the noise about these issues.

As others engaged with ThingsCon, Nadia additionally adds that ThingsCon is a community that while embracing various actors, 'caters to academia'. As also indicated through the reflections from Roy above, this is both regarded as a positive potential and a challenge.

I have shared some empirical insights into why different members of the ThingsCon community participate in events and other initiatives. During other interviews and innumerous informal conversations during my ethnographic involvement with ThingsCon over the course of three years, a similar sense of individual unease was broadly shared along with an emphasis on how ThingsCon events cater to this outside one's ordinary activities. A red thread running through the motivations of several ThingsCon participants to enter this community is to move from an individual sense of ethical unease to a collective where one can share concerns and a desire for change. As I share with a ThingsCon participant at a conference in Rotterdam 2017 that I have been doing fieldwork in an Italian ecovillage where inhabitants hug trees to get closer to nature, he jokingly responds that I found 'my tribe of tree huggers in IoT' through ThingsCon. This quote indicates a sense of community – a tribe – glued together through its work on our relation to IoT connective devices in new ways that ethically challenge how we relate to these technologies.

The presented empirical examples of who participates in ThingsCon and why they participate lead us back to the thinking of Zigon, and how ethics can be seen as a tactic and a response to a moral breakdown driven by an imperative to 'keep going' to move out of this state (2007, 137;139). An incentive to act and bring about change that can be mobilized both on an individual level and on the scale of a social group (Ibid., 140), and communal aspects of responding to an ethical unrest are central to the motivational tales from ThingsCon participants brought forward in this section.

To sum up, I have now shed light on how ThingsCon embraces different participants individually moved into this community in response to an ethical unease springing from their own experiences. ThingsCon not only brings together individuals, but also organizations, companies or representatives of political bodies involved with IoT in various ways. *Dyne*, as you have encountered in the previous chapter, is one example of an organization participating in the ThingsCon 2017 conference, while a previous member of the IoT-EG ethics subgroup also participated and presented at the same event.

Since I have already introduced you more in detail to Dyne and the Dowse box, I will in the following bring you to the *Mozilla* offices to share another example of an

organization involved with ThingsCon driven by different interests and incentives. This was back in the Wedding district in Berlin during my first encounter with ThingsCon a couple of years before my interview with Gabriel took place at a café in this zone of the city. In the following I will exemplify how threads of concern around IoT creation weave in and out of this umbrella organization, that ThingsCon is not just an event for individuals. This leads us into a part of this chapter where I commence a transition from focusing on who participates in ThingsCon and why, to analyzing where discussions around ethics and IoT take place in spaces created by this community across Europe. I initially entered ThingsCon through an event that was not a ThingsCon salon per se, though it also included one. Let me describe my first encounter with ThingsCon.

#### Finding Fellow Travellers: Organizational Participation

On an early Thursday morning in March 2017, about three months into my PhD project, I leave Copenhagen to attend a two day 'retreat' hosted by the *Open IoT Studio* in the Mozilla offices situated in Berlin. A ThingsCon founder will also participate in this IoT retreat and host a ThingsCon salon in the same venue on the first evening. The retreat venue is an old factory-like building in the Wedding district, characterized by streets made of cobblestones right next to a park with an iconic graffiti-painted second world war bunker turned into a viewpoint - the *Flak Tower III Humboldthain*. This geographical zone is not far from *The Wall Museum* reminding everyone of the division of Berlin into 'East' and 'West' not too many decades ago, and through various walks and talks during the retreat we all get a chance to explore this neighborhood.

The event is hosted by Anja and Emil, describing the purpose and the outcome of the Open IoT Studio retreat. It is a chance to 'gather allies' and figure out how to 'work together and support one another in fostering responsible, healthy IoT in 2017 and beyond.' In addition, a desired outcome is to cultivate deeper relations and to 'grow the circle.' In an interview with Anja who works at the Mozilla Foundation as a senior program officer, she tells me a bit more about the drive to initiate the Open IoT Studio and why this initiative is in the interest of Mozilla. As described on the official webpage for the Mozilla Foundation, it is 'Mozilla's duty to ensure the internet remains a force for good' (Mozilla n.d.), and for Mozilla this involves work 'to ensure the internet remains a public resource that is open and accessible to us all' (Mozilla n.d.*a*). In the following quote from our interview, Anja links an interest of Mozilla in 'Internet health' (2016) to the more IoT specific interests in the Open IoT Studio:

So, we started the Open IoT Studio a few years ago for a few reasons, because Mozilla as a non-profit has always been really interested in like, the open internet. And for a long time that's been mainly understood to be first on the desk-top, then on mobile, and as you know we have just over the last few years seen the rise of the internet being in other kinds of objects. And the kind of internet health issues that arise are either amplifying the existing issues of the internet or complicating them and adding new dimensions as you start you know having other kinds of sensors and interfaces and just a multitude of data and stuff. And so, it was kind of born from this sense of like, ok, if we care about internet health, then we're gonna have to care about all the new interfaces we add to the internet.

So that was the main pitch to the organization and the way we tried to go about it. So we partnered with the University of Dundee and Emil. He has also been looking at the role...he's been calling it like the physical web, and he was coming from like, a product design background and thinking about like, creative technologies and what are the physical aspects of the internet, and so it felt like a natural fit to explore it together.

Anja explains that the Open IoT Studio was started because Mozilla has an interest in critically understanding the workings of IoT technologies since the foundation cares about 'Internet health.' As a consequence, Mozilla also works for 'A Healthy Internet of Things' (2016) which is the title of a publication included in my co-authored analysis of IoT manifestos (Fritsch et al. 2018). Anja explains how new interfaces added to the Internet might affect its health, 'complicating' or 'amplifying the existing issues.' In Mozilla's (2016) publication on practices for a healthy IoT it is stated that 'IoT is in many ways an evolution of the Internet. [...] What happens when most people and most things are creating networked data all the time?'. Yet again we see how questions about technological ubiquity are mobilized with the advent of IoT, in this context, as a cause for concern in regards to the health of the Internet. Or to put it in another way; as Internet health is both underpinning and influenced by a healthy IoT and vice versa from the perspective of Mozilla, this is a point of attention that the organization brings to the Things-Con community.

During the Open IoT Studio retreat, space was made in the program to share experiences more informally, for instance during a walk and talk along the Berlin wall museum or while eating high Berlin quality vegetarian food, acts of socializing that tie into the aim of the event as expressed by Anja:

We just set about to like, find fellow travellers who are asking kind of similar questions [...]. We really were interested in the kind of people working at like...we were calling it practitioners, so people who were interested in either what it takes to actually design or develop IoT, what does it take to advocate for certain policies, to like, legislate or otherwise like, create a proper legal environment for IoT challenges. And then also, like, having some of the design research and speculative design stuff as part of that as well.

What I wish to illustrate with this empirical example of an organization that participates in ThingsCon is the centrality of finding 'fellow travellers,' 'gathering allies,' and 'growing the circle' in collaborative attempts to shed light on some problematic aspects of IoT development from different perspectives. This adds to a mission of collectively working through some of the issues around IoT technologies rather than tackling them in isolation as lying at the heart of ThingsCon initiatives. That Mozilla both hosts and participates in ThingsCon events stands as an example of how this community embraces uncertainty and unease about the state of IoT development, articulated in different ways such as through the concept of 'Internet health.' On an individual or organizational level, people involved with IoT development are looking out for others who find themselves in a similar state of concern which moves them into this community. ThingsCon creates public spaces for people to join in, meanwhile the community also reaches out and hosts events in different venues chosen because they support the mission of ThingsCon one way or the other.

As the word 'retreat' indicates, the IoT Open Studio event is a space out of the ordinary, partially created as an intersection with a ThingsCon salon. I will now commence my analysis of the kinds of rooms for ethics that the ThingsCon community actively designs and what characterizes them. This requires a move beyond an analytical gaze, resting on individual self-cultivation to some aspects of crucial importance of this particular enactment of ethics and IoT in the shape of events, the carefully designed 'rooms for ethics' (Douglas-Jones 2017) and their material settings for 'public participation' (Marres and Lezaun 2011). Nevertheless, I first wish to exemplify what actually goes on at ThingsCon events and where they might take place with the 2018 conference in Rotterdam as an empirical example. I will then analyze what it takes to design these temporary and extraordinary spaces for ethics and IoT.

#### Setting a Stage for Ethics in IoT Extraordinarily

The ThingsCon community facilitates events such as salons and conferences, and at the fifth edition ThingsCon conference in Rotterdam 2018 the overarching theme of the event where people gather around things is: 'It is time for a system reboot.' As this sentence explicitly declares, the thematic of this conference addresses a need for change in the current state of IoT development at this particular point in time. A 'reboot' that evolves around not merely individual IoT practitioners, but the whole system that they operate within as I will return to in the final section of this chapter.

When ThingsCon provides an environment and a space to collectively reflect upon matters of ethical and responsible IoT, the topic of events such as the 'system reboot' often tie into the form of the initiative and the chosen venues. The conference in question for instance took place in *Blue City*, a venue that was previously an enormous aquarium with lots of swimming pools now turned into a tinkering makerspace and a zone for startups to meet (BlueCity n.d.) partially depicted on Figure 14 in Chapter I. As the slogan on the official Blue City webpage puts it under the headline *BlueCity - surfing the new economy*: 'BlueCity is where start-ups create new waves, and where corporates can catch the tide' (Ibid.). Expressing an interest in 'the new economy,' Blue City supports the topic of the system reboot that sets the tone of the ThingsCon 2018 conference. Roy shares with me how 'with the large conference it's about trying to bring as much of the

community internationally together as possible,' whereas the salons often bring together the local ThingsCon community in a given location, he explains. The conference is organized in a way that allows both a collective gathering of all participants and more dispersed participation where different workshops take place simultaneously and where one has to choose which to attend. There are key notes, discussion panels and workshops such as the one on 'Intro to designing out waste' hosted by Nathan and Yvonne, while other sessions are about 'Connected Toys Design in a Sensitive Context,' 'Getting started with NB-IoT' or 'Build Voice-Powered IoT'. During the conference in Blue City, two rounds of workshops with a two hour allocated time slot took place each day. Where the workshops offer more hands-on engagement, others invite discussion and collective reflection.

One workshop that I attended in addition to Nathan and Yvonne's was an 'Ethics education workshop' explicitly addressing the theme of ethics in IoT. At the workshop, five panelists all engaging with this phenomenon through their academic teaching were discussing how to approach questions about ethics in an educational context. During this panel, it was emphasized that when ethically dealing with emergent technologies, one is faced with new technologies that are still not established and this is why there are no clear rules about how to use technologies. 'Do emergent technologies come with emergent ethics?,' it was asked at some point followed by the question 'what does it mean to have ethics as an integrated part in IoT?'. These questions initiated reflections about how design is never neutral. That something is always designed *by* someone. And as a consequence, an argument that ethics must be an integral part of teaching design.

Staying with the thematic of ethics and design, a plenary talk on 'Future Ethics' by designer Cennydd Bowles towards the end of the first day of the conference looked into exactly the topic of ethics in technological creation. The talk took its point of departure in the title of a book recently published by Bowles (2018), and opened up with the statement 'when you invent a ship, you also invent a shipwreck.' Bowles continued his presentation by bringing forward how future tech raises the ethical stakes, urgently arguing that 'it is about time we took ethics seriously.' Following on from this, he – in line with the ethics education panel – introduced design as 'applied ethics,' suggesting that 'morality is a muscle that needs exercise. We have to start asking ourselves difficult questions.'

This brings us back to the opening of this chapter where Gabriel, as a response to his own question about what one does when realizing that technological creation is not inherently a force for good, personally started always asking himself 'this is what I think a technology can do being used for good, but how can this be used for bad?'. After Bowles' talk, two of the ThingsCon organizers of the event dwelled on the theme about the relation between ethics and design by focusing on practitioners in concrete situations where technologies are developed and design decisions must be made. The first question was 'can you name your worst design decision from a moral point of view?', where Bowles

in his response brought up how 'ethical harms often get clouded by innovation.' Because of this, one has to ask, but 'who is the client?', emphasizing just how difficult it can be to make morally informed decisions in collaborative processes.

The second question was 'if you are currently employed in a company and witnessing doing harm – how can we help that person turn the ship? What actions should we take?'. In the response to this question various dimensions were brought up such as 'constructive disobedience' and 'ethical by design.' It was suggested that one finds moral allies since it can be a risky endeavor as an individual to act if one localizes potential sources of harm caused by technological creation in a company. Getting fired is the main risk where an incident in Google is brought up as an example.

Allies are exactly what ThingsCon participants in earlier sections of this chapter express that they seek out in this community as they individually wonder whether others feel an ethical unease, and where to find people who feel similarly. The Q&A session that I have just described after Bowles' talk brings up how the participants in this particular event might agree that something is ethically off in IoT to be asking these questions, but that a room for doing so perhaps does not exist in many companies. This leads me into my next analytical move allowing us to better understand what characterizes the ethical enactment of IoT and ethics that ThingsCon events instantiate.

Up until this point of the chapter, the thinking of Zigon supports an analysis directing our attention towards how ethics can be seen as a tactic and a response to a moral breakdown (2007, 137;139). This is driven by an imperative to act and move out of this state by, for example, attending ThingsCon events. As Nathan very honestly shares, he has somewhat 'selfish reasons' for attending events such as those initiated by ThingsCon, as he tries to figure out for himself how to 'live a good life' while being forced into a framework of 'horrifying hypocrisies'. While it would indeed be interesting to pursue a deeper analysis of how practices of ethical self-cultivation and deliberate efforts to do 'good' evidently at stake play out, there is something else about the enactment of ethics and IoT in ThingsCon events particularly that catches my ethnographic eye. An insight that manifests in the comparative constellation of ethical interventions into IoT that this dissertation explores. The Q&A session towards the end of Bowles' talk illuminates how ThingsCon events provide a space for ethical reflection that is extraordinary and not just existing in the everyday work places where technological creation unfolds. This allows for noticing how these public gatherings around connected things in the light of ethics do not appear out of thin air.

I will now introduce the sources of thinking that allow me to articulate what characterizes the ethical intervention into IoT that an enactment of ethics at ThingsCon events is a case of, and why we need an analytical gaze beyond ethical self-cultivation to attend to these ethical publics rising extraordinarily. As ThingsCon participants act on their sense of ethical unease and a need to bring about change, they enter a certain space for ethics that is designed to gather numerous bodies around this matter publicly. In the following, I

bring forward theoretical inspiration to think about an intersection of deliberate attempts to make 'room for ethics' (Douglas-Jones 2017) and the materiality of participatory publics (Marres and Lezaun 2011) to explore what it actually takes to create an eventful space for ethics.

#### Making Room for Ethics and the Materiality of Participatory Publics

Inspired by STS, Douglas-Jones suggests approaching ethical review as a material practice (2017, 13). Through a study of a capacity building Asia-Pacific NGO seeking to train ethics committees, Douglas-Jones illustrates how efforts to 'make space' for ethics unfold in practice (Ibid.). In doing so, Douglas-Jones makes a case for not merely attending to the content of ethics as committees reach their decisions, but to consider ethical review 'as a set of practices that mark out space [...] in terms of claiming "real estate" for ethics' (Ibid., 14). Douglas-Jones brings our attention to how 'the location of ethics' is a central question for ethics committees understood in more than one way as they both consider where to have their discussions and how to 'make others see ethics as important' (Ibid., 14-15).

Even though ThingsCon does not engage with ethics in a formalized bureaucratic context, this two-fold question of making space for ethics brought forward by Douglas-Jones is also visible in the practices deployed to claim a territory for ethics in the organization of ThingsCon events. Considerable efforts to choose and design the venues for having discussions around ethics and IoT are at play which is empirically touched upon in the previous section and which will be demonstrated in more analytical detail in the remaining part of this chapter. Douglas-Jones' point about the role of a more 'figurative' dimension in attempts to make space for ethics (Ibid., 14-15) illuminate how the motivation to create ThingsCon events tie into a desire for influence, change and impact.

A final central point from Douglas-Jones for my analysis is that 'a separation between the form of ethical review and the ethical content of decisions cannot be entirely clean (Ibid., 27), and that 'to "make space" for ethics is the work of everyday politics' (Ibid., 17). The idea that the form and content of ethics fold into one another in the design of ThingsCon events is already indicated in the example of the ThingsCon 2018 conference taking place in a venue catering to initiatives that spark 'a new economy', speaking to the theme of the conference about how 'It's time for a system reboot' (ThingsCon 2018). I will shortly illustrate what this point by Douglas-Jones allows me to articulate with a ThingsCon salon on resurrection around Easter 2019 as an example. I first wish to link Douglas-Jones' argument about how it requires material practices to carve out a space for ethics (2017, 13) to the thinking of Marres and Lezaun (2011). Their material approach to participatory publics add a dimension to the study by Douglas-Jones which is relevant for the ethical rooms provided through ThingsCon events. Whereas Douglas-Jones builds her argument on an ethnographic study of ethical reviews by committees that unfold in more exclusive rooms, ThingsCon events are public and open for participation which is a central characteristic of the way in which ethics is enacted through these gatherings. I will now briefly touch upon the chosen format of the main part of ThingsCon events – salons – since this choice speaks to the points made by Marres and Lezaun.

#### Salons and the Public Sphere

One form that ThingsCon events take is the shape of *salons*. Looking into the history of salon culture, especially flourishing in Europe in the 17<sup>th</sup> and 18<sup>th</sup> centuries, salons have played a central role in cultivating a European public sphere through creating communities and new forms of participatory democracy. Immersed in an aura of Enlightenment, 'salons were social gatherings in which individuals engaged in the art of conversation in pursuit of knowledge and fellowship' (Kolata 2021). Cultural historian Floris Meens distinguishes salons from other forms of sociability such as a casino or a café because salons provide 'a unique contact zone between the public and the private spheres' (2018, 2).

Insights on the form of the salon and the history of this phenomenon are relevant for analyzing how ethics is enacted in the case of ThingsCon events. These include the blurring of the divide between public and private spheres as a characteristic of salons which is somewhat illustrated through the voices introduced earlier in the chapter. This shows how an individual sense of ethical unease around IoT is brought into a public space. Another central dimension of salons indicated is the role they play in creating a European public sphere through social gatherings and communities where different kinds of participatory democracy thrive.

Questions revolving around publics, participation and democracy are at the heart of Marres and Lezaun's thinking, highly influenced by the recent 'material turn' across various scholarly fields (2011, 490). Exploring the question of public participation, Marres and Lezaun rhetorically ask the question, 'what are publics made of?' (Ibid., 489). According to them a widespread answer would be 'of people,' with the addition of 'people engaged in a particular form of public or political action' (Ibid.). Marres and Lezaun argue why we must move beyond this assumption and include material dimensions into our approach to public engagement (Ibid., 489). While they recognize that material aspects of citizenship and engagement are addressed in post-Foucauldian research through an attention towards matter as a 'constituting force in the organization of collectives,' they point to how focus is still primarily on the cultivation of political *subjects* (Ibid.).

As I have illustrated above, what brings together several members of the community participanting at ThingsCon events is a sort of ethical unrest sparked by the current state of IoT creation. Inspired by the thinking of Zigon I have analytically articulated how this leads them into action (2007, 139). The thinking of Marres and Lezaun allows me to analyze the material dimensions of participation in performances of the public (2011, 496), complementing an analysis of how individuals cultivate themselves as ethically engaged subjects in the space of IoT by attending ThingsCon events.

An interest in the socio-material dimensions of public engagement are increasingly incorporated in studies of political participation and citizenship across different disciplines (Ibid., 490). Accordingly, Marres and Lezaun point to how research on *political* or *ethical involvement* in various disciplines such as anthropology, STS, sociology, and political theory have turned to 'the role of materials and artifacts in the public organisation of collectives' (Ibid.). Marres and Lezaun emphasize that 'this mode of inquiry stands in stark contrast to those traditions that define publics and their politics largely in discursive, linguistic or procedural terms' (Ibid.). In the previous section, I presented examples of what is being discussed in ThingsCon events such as during the conference in Rotterdam 2018. I, however, focus my analysis directly towards not merely how the participants are brought together through their shared interests and discussions, but how a range of material components are part of creating this collective and the kind of ethical engagement that it enacts.

#### Scripts of Participation in Ethics and IoT

According to Marres and Lezaun, 'things,' 'substances,' and 'material settings' take part 'in the composition of that distinctive political collective we call public' (Ibid., 497). With reference to Foucault's (1991[1974]) thoughts on the 'physique of the public' (Ibid., 494), they emphasize that a range of influences play a role in enactments of material participation, public engagement and political practice, inviting us to empirically explore this. An approach to the organization of public participation embracing its material dimensions implies a 'political and moral *expansion* [...]; a move "beyond the human", a broadening of the range of entities that ought to be considered relevant to the fabric of political communities' (Ibid., 493).

Marres and Lezaun's argument for moving beyond the discursive studies of public participation brings my attention to what ThingsCon is doing that is more than talking through physically bringing people and IoT technologies together. Already in the first chapter of this dissertation I introduced a cue revealing how IoT technologies themselves take part in ThingsCon conferences by showing a prototype of experiments with connected drinks at the ThingsCon 2018 conference (see Figure 15). Another central material component of participation in ThingsCon events is the creation of nametags upon arrival, a welcoming gesture. This always makes me slightly nervous, as while other participants have a capacity to create rather spectacular nametags with light bulbs from the materials at our disposal, I myself have no idea how to make that work. In addition to nametag creation, IoT prototyping, and already existing IoT inventions, the choice of food – most often vegetarian – and beverages are also an integral part of these events. Taking place in the carefully chosen venues such as Blue City at the ThingsCon conference in 2018, these choices further speak to the theme of a 'system reboot' by engaging with a 'new economy' (Blue City n.d.).



FIGURE 32. Participant creating a nametag at an event in Amsterdam 2017 (ThingsCon 2017)

Directing our attention towards the diversity of entities participating in public engagement, Marres and Lezaun suggest that deliberate efforts are made to design settings for public participation (2011, 495). Alternative 'material settings' might express forms of participation deviating from 'conventional formats' (Ibid., 490;493), and have the capacity to affect 'the form of political life' (Ibid., 492). This leads them to argue that public participation involves 'labour, effort and work' (Ibid., 492), emphasizing the importance of attending to 'material settings that are carefully designed and arranged to produce participation' (Ibid., 495). As the configuration of a public event is thus linked to the design of an environment in the thinking of Marres and Lezaun (Ibid.), design plays a central role for what is prioritized in public engagement influenced by 'the normative valence of design options' (Ibid., 501).

During the course of my fieldwork I have had a chance to participate in ThingsCon events and talk to founders about what goes into creating these spaces which the next section of the chapter explores. Marres and Lezaun draw attention to how settings carefully designed to cultivate and compose a participatory public around a matter correspond to the materiality of ethical interventions in the shape of ThingsCon events. An analytical gaze combining the thinking of Marres and Lezaun and Douglas-Jones is relevant for my analysis of a ThingsCon resurrection salon. Rather than diving into individual worries and content of discussions around ethics and IoT taking place at ThingsCon events, I now wish to look into how the events provide conditions for a participatory public around IoT to emerge. I now pursue my argument about how spaces are deliberately designed for ethics 'to happen' extraordinarily at ThingsCon events.

#### Creating a 'Safe Space'

We are now back in Berlin and the Prinzessinnengarten close to Moritz Platz in August 2019 where I am interviewing one of the ThingsCon founders, Alexander. I ask him in a bit more detail about what kind of space is created through ThingsCon events:

One of the things we always had in mind and a term that we use sometimes was to create, we called it kind of jokingly like a 'safe space', or for people to just exchange their ideas, but really it's like a place where people could not just share their success stories, but also learn together. And it can be really humbling and just say, 'hey, here's a thing I'm trying to wrap my head around and understand', or 'here's something I think we may have screwed up, how can we do this better'. Just like thinking it out loud. And it blows my mind even like today to see just like, how that culture has kind of been stable over the years. Like I have hardly ever heard anyone being attacked for an idea. I hope I didn't just miss it, but I have really not encountered this. We try to stay away, for example, from having people present super flashy things like product presentations or something. We would rather that they share their thought process. It's really a space for mutual learning. I think it's like the place we try to create there.

And one where it's ok to say 'I don't know'. Which in big industry conferences is just not a thing that people normally want to hear or see. But I think you really should. Because as it is, everybody just repeats the same mistakes over and over again and in order to make it better for everybody, we need to spread that knowledge around. And that's why we also try to capture these things within our very limited means in publications and other stuff where we just try to take all these insights and push them out into different channels. Sometimes with more reach sometimes with less, but that's always the intention, to just like, take that knowledge and make it accessible.

I ask Alexander about what it actually takes to create this kind of space:

It should invite conversation, it should be casual, but not super shabby, but also driven by the practicalities of well, we need to make this happen with limited resources, and how do you find that space, right. That's pretty much the approach we have taken to all these things. It's not like via a giant masterplan. We just improvise this and a certain culture emerges from that I think. Even like the fact that we go about it like this rather than writing down a template first. That is already like part of the DNA, that we all develop this together. None of us get really paid for all of this so we have certain time and resource restraints. Other than that there's a lot of freedom to explore things and then I think from this a certain culture emerges.

Alexander here explains to me that ThingsCon seeks to create what they internally call a 'safe space.' A space where attendants are not merely present to share success stories. A space where one is not attacked for sharing an idea, and where it is accepted to say 'I don't know,' which Alexander believes is not what people want to hear or dare to bring up in big industry conferences. He suggests the positive impact of saying out loud that one might 'have screwed up' as an intention to vocalise the will to do it better through

mutual learning in order to break a chain of repeated mistakes. Alexander also considers it to be in the very DNA of ThingsCon that spaces are collectively developed with limited resources as nobody gets paid, emphasizing that the venues that they choose for events should invite conversation. Elaborating in a bit more detail on the choice of venues for ThingsCon events, another founder in ThingsCon, David, explains to me how:

We had it in different venues. Depends on for what. For the smaller ones, like the unconf or our camp, I think a venue that feels a bit like a home. Like in 2016 we were in some small kind of castle or like a big villa or so in the countryside in Berlin, it was a bit run down, but the people that were living there were kind of cooking and has a nice garden so it was a very kind of intimate kind of place. And small. Food was homemade, vegetarian. I think something like that is nice. Even at the bigger events the catering company that we always work with in Berlin at least makes really nice stuff. I don't know if it's so visible as a participant or a visitor to the conference, but they are really friendly people. At least as an organizer it feels good to do this. You can tell them whatever you want and they try to make a good offer and it's all vegetarian stuff. It's something great. I guess, yeah, it kind of feels nice to do. And venues, I think it has to be comfortable places. [...] Something that's a little bit special. Like the Rotterdam one, Blue City, that was really nice.

David brings up that he prefers when venues are a little bit 'special,' such as Blue City for the ThingsCon Conference in Rotterdam 2018, an aquarium now containing tech creators rather than substantial amounts of water. Adding to Alexander's reflections, David emphasizes how much attention is also paid to the choice of food, often working with a friendly vegetarian catering company in Berlin. And that he, especially for smaller ThingsCon events, prefers 'an intimate kind of place' in a homely venue. The points from Douglas-Jones (2017) and Marres and Lezaun (2011) about how design efforts take part in cultivating settings for ethics and public participation illuminates the work involved in providing the spaces that ThingsCon aims for in the context of IoT. These rooms for ethical reflection to take place are somewhat extraordinary, crafted and temporary. The following empirical example will show in more detail how their form and content inform one another (Douglas-Jones 2017, 27).

#### An IoT Resurrection Salon with the IoT Voodoo Masters

As I enter a church in the middle of Rotterdam directly after ending a seven hour train ride from Berlin, I am hit by a familiar slightly moldy scent characterizing many of the churches I have visited previously. I am immediately struck by the combination of this smell and the recognizable church glass mosaics embracing a big table in the room of the church. The table is full of materials and IoT devices; an element that immediately makes me feel like being in a maker space right here in the middle of a church. About ten people are sitting around the table, tinkering and seeking to bring back the devices on the table to life in different ways.

Extract of field notes, May 16 2019.

This is the space for ethics and IoT I enter upon arrival to an Easter-inspired ThingsCon salon on *Resurrecting IoT Darlings*, Thursday May 12 2019. The salon takes place in a Rotterdam-based church with a theme attending to the *afterlife* of IoT devices, and the possibility of designing for an extended product life cycle (ThingsCon 2019). In the framing of this salon, we see how the ethical theme of the event overlaps with the very location chosen for the salon.

As already indicated, 'salon culture' has played a prominent role in cultivating a European public sphere through creating communities in pursuit of Enlightenment since the 17th and 18th centuries (Kolata 2021), bridging public and private spheres (Meens 2018, 2). I now analyze this particular ThingsCon salon that shows to us how content and form combine in an effort to make room for ethics as argued by Douglas-Jones (2017, 27). This calls for us to embrace more than human 'entities,' 'settings' and 'substances' in studies of public participation as illuminated by Marres and Lezaun (2011, 5;11). The resurrection salon serves as an example of showing how events organized by ThingsCon are carefully designed and arranged in venues supporting the theme of a given initiative in order for a certain atmosphere to occur, supporting ethical points tied to the very topic of the salon. Before unravelling this in more detail with the ThingsCon resurrection salon as an empirical example, I will briefly situate the topic of the salon in a context of broader concerns evolving around its ethical thematic.

The ThingsCon salon in question engages with 'what can happen when a the digital side of your favourite smart product dies' (ThingsCon 2019). This addresses a lack of alignment between digital and physical lifetimes of IoT technologies also brought up in numerous IoT manifestos as analytically localized together with my co-authors (Fritsch et al. 2018). Questions about 'lifetimes' and 'lifecycles' of IoT are ethical concerns among several members of the ThingsCon Community, as expressed in the workshop by Nathan and Yvonne at the conference in Rotterdam 2018 on how to design out waste. During an interview a ThingsCon founder, Alexander, also brings up the topic of the lifecycles of IoT devices, stating that they 'don't make things that work perfectly, but stop working really badly. If they don't work perfectly, make sure they degrade gracefully'. Adding to these thoughts, the London-based designer Nadia in an interview highlights an aspect of the life of IoT technologies touching upon how these connective devices according to her must be created in such a way that they can also be disassembled:

Another one of my IoT utopian kind of ideas would be for people to literally be forbidden either by regulation or otherwise, and I have to say it is probably gonna be regulation, they should be entirely forbidden from developing a product that can't be disassembled. Just the idea that there are things that are glued together, that will stay glued together until a small child pick it from a giant pile of crap is unfathomable. Because it's a design decision. [...] Any certification whatsoever, it has to include a design for disassembling components.

While Nadia addresses a question about the right to disassemble IoT technologies, the ethical themes of the environmental impacts of IoT also touches upon numerous other issues. For example, issues surrounding rare earth minerals, energy, plastics, and other materials during Nathan and Yvonne's workshop inviting questions of sustainability, recycling, resilience, reuse, obsolescence, lifetimes of physical and digital components, or the right to repair. I am tempted to pursue an analysis of these empirically mobilized themes in dialogue with ongoing research into rethinking technological repair (Jackson 2014), the environmental footprints of digital infrastructures in the design of clouds and devices (Preist et al. 2016), or the ubiquity of sensors on an increasingly 'computational planet' (Gabrys 2016). However, I will leave this analytical avenue open for future exploration to stay on track of the argument of this particular chapter and its role in the comparative constellation of ethical enactments that this dissertation explores.

Returning to the ThingsCon resurrection salon, why do we want to be able to bring dead IoT back to life? What does a dead IoT device look like? If a digital service that provides power to your connected device stops working then 'you are often left with a beautiful but lifeless physical counterpart' (ThingsCon 2019). This call for the salon states it's case before sending out an invitation to learn from 'IoT voodoo-masters' about how to bring dead IoT artifacts back to life (Ibid.). Roy, who works within the field of design and creates 'well-behaved products' as already presented, is the organizer of the resurrection salon. In the following quote from our interview in the fall of 2019, Roy connects the topic of an ability to disassemble IoT technologies and their lifecycles to the thematic of the resurrection salon in Rotterdam about the afterlife of IoT devices. I ask Roy about what motivated him to organize this salon:

So, it was one of those topics, as I mentioned, like there was this thing at least in my head, like I want to do something with – at that time I called it like 'with repair' – and there were a few things going on about the right to repair like in the US court cases relating to I think iPhones and agricultural equipment and some smaller things as well. But also like the sustainability angle, like if you want to create products in a more sustainable way it's good to be able to repair them. So those are all things that are more generally happening in products and product development. And also the relationship that people have with the products. And if you add to that like typical IoT products they usually have a physical component and a digital component falls over or dies then you have this beautiful object that doesn't really do anything anymore. So that was one of the main things.

And then I found a couple of examples where people who really liked a product resurrected it. And I thought, ok, I was really interested in hearing from them why they did it and what that means. So why they started it and what they ran into when they tried to do it. And then especially to end with the question: what can we learn from this for future products?

We had a really nice combination of speakers coming from different directions. People who did resurrections themselves, people who are more into like, the physical sustainability angle, so what does it take to create a product that is reparable and reusable and in the end maybe designed for disassembly and recycling if needed. So that was a nice combination of different angles for this topic and that in combination with the workshop we did where we really resurrected these devices.

Roy brings up a curiosity towards issues such as the ones introduced by members of ThingsCon more broadly above, thematics motivating his organization of the ThingsCon resurrection salon. He then goes on to explain how he started looking out for people who had resurrected products, and how the invited speakers addressed the theme from different angles. As he also reveals, this salon embraced a hands-on workshop where participants had a chance to experiment with recurrecting IoT devices themselves before learning even more about how to do this from 'IoT voodoo-masters'. This was the space for ethics and IoT that I entered upon arrival at the salon where about ten people were already eagerly tinkering with bringing dead IoT devices back to life in what felt like a maker space in the middle of a church. In the following quote from my interview with Roy it becomes evident how the choice of venue, theme and timing for this salon was deliberately thought into its design:

Once we had the topic and the framing of resurrecting, I thought, ok, ideally we do it at Easter, and ideally we do it in a church and then it was a bit later than Easter, but the church did work out. So that was really nice.

The short vignette earlier in this section based on an extract from field notes conveys the atmosphere of the whole setup of this salon, and on the pictures below you see a line-up of dead IoT devices to be brought back to life along with participants seeking to do so.

After hands-on explorations in the beginning of the ThingsCon resurrection salon, a second part of the event later in the evening took the shape of presentations from 'IoT voodoo masters' where they shared experiences about for instance repair of connected products with all participants. This opened up for a collective reflection upon various learnings for future IoT inventions to incorporate and attend to the ethical thematics addressed. However, the message of the salon was not only communicated in spoken or written words. As Marres and Lezaun bring to our attention, 'things,' 'substances,' and 'material settings' take part 'in the composition of that distinctive political collective we call public' (2011, 11). The ThingsCon resurrection salon opened up for working with both IoT artifacts and IoT as a material that has consequences in the wider world. This speaks to its ethical thematic and actively takes part in the public engagement with IoT unfolding at this event where also the material settings play a role for conveying a message and cultivating an atmosphere.



FIGURE 33. A line up of dead IoT technologies to bring back to life, ThingsCon Salon 2019



FIGURE 34. Participants experimenting with 'Resurrecting IoT darlings', ThingsCon Salon 2019



FIGURE 35. Setup before the ThingsCon Salon 'Resurrecting IoT Darlings' 2019

In the picture above we see a lineup of empty chairs awaiting participants to seat themselves for the second part of the resurrection salon where speakers talk about their various experiences and engagements with its theme. One of the speakers, Tim, is a member of the core ThingsCon team involved with *Better IoT*. This is 'a community-led effort to make a free, accessible, open assessment tool aimed at startups and SMEs to help them design better connected products' (Better IoT 2021). On a slide, he suggests three 'must haves' in the context of IoT lifecycles that 'Allow users to factory-reset the device'; 'Be clear about the expected service lifetime of the connected product.' Tim then moves on to share three 'nice-to-haves': 'Do not degrade or change the core functionality of the connected product over its lifetime'; 'Document any parts that a user can repair using common tools and skills,' and 'Supply spare parts on request during the life-cycle of the products.'

Returning to the point by Douglas-Jones about how making space for ethics can be regarded as a material practice where form and content fold into one another (2017, 27), this ThingsCon salon exemplifies how careful attention is paid towards a conjunction of the salon topic and the form it takes as a designed space for ethics and IoT is materially crafted. Marres and Lezaun articulate that careful attempts to design and arrange material settings are intended to 'produce particular effects' (2011, 495), why they become 'a notable means of materially scripting participation' (Ibid., 496). What is worth noticing

at the design of the resurrection salon is that the material scripting of participation embraces the seemingly dead IoT devices to be brought back to life through hands-on experimentation. Meanwhile they also embody the very message of the salon about the ethically problematic aspects of their life span and afterlife. According to Marres and Lezaun, 'matter does not only subtly contribute to the formation of political subjects,' since 'material things, technologies and settings themselves become invested with more or less explicit political and moral capacities' (Ibid., 8). Some objects for instance acquire 'the capacity to mediate matters of concern' (Ibid.). It is beyond the scope of my analysis in this particular context to unfold in more detail how the dead IoT devices and their resurrection through hands-on assistance actively participated in the salon. Yet I do wish to shed light on how the lineup of lifeless IoT technologies and experiments to reanimate them together with the church setting, its moldy scent, the glass mosaics, and a belief in the possibility of re-surrection become part of the enactment of ethics in a salon dedicated to explore this ethical thematic.

To sum up, the ethical theme of this ThingsCon resurrection salon is not merely discussed with a point of departure in presentations and words, but also addressed through handson IoT live aid in a setting staging the resurrection of Jesus after his death by crucifixion. It is a space that is extraordinarily designed to bring together IoT technologies and their creators to experimentally explore a question about how to resurrect IoT darlings and design for an extended lifecycle. This ethical theme is collectively explored in public, and a church serves as the material setting embracing participants who have been openly invited to gather around this topic. The ThingsCon resurrection salon exemplifies why we need to move beyond a focus on discourse both in studies of ethics (Douglas-Jones 2017, 13) and public participation (Marres and Lezaun 2011, 490). Marres and Lezaun's thinking about the materiality of public engagement is also an argument about political participation and ethical involvement in larger collectives (Ibid.). This leads me to a final section of this chapter where I return to the theme of the ThingsCon conference in Rotterdam 2018, and how 'it is time for a system reboot' which indicates a desire for change beyond the level of individual participation.

#### Calls for Change

We now move from the church in Rotterdam 2019 to the BlueCity aquarium nearby, back to the ThingsCon conference in 2018 where it is very explicitly declared that this community is not merely seeking discussion, but also impact and change. The call for the conference – 'It is time for a system reboot' - marks a turning point in ThingsCon:

Now, 5 years into ThingsCon, the need for responsible technology has entered the mainstream debate. We need ethical technology, but how? With the lines between IoT, AI, machine learning and algorithmic decisionmaking increasingly blurring it's time to offer better approaches to the
challenges of the 21st century: Don't complain, suggest what's better! (ThingsCon 2018)

As this quote indicates, a lot is still unknown about how to address a need for ethical technology, yet it is time 'to offer better approaches' and to 'suggest what's better'. This leads me back to the theme raised at the end of the first chapter of this dissertation containing a composition of my encounters with IoT culminating in an open-ended question: what kind of future with IoT technologies do we want?

In the call for the ThingsCon 2018 conference, we learn that at this moment of time 'the Internet of Things (IoT) is maturing' and has 'entered the mainstream debate' (Ibid.). Even though several ThingsCon participants have continuously expressed to me how many highly troubling things in the world of IoT were not even a topic of conversation a few years back, the call for the conference expresses a belief that the need for ethical and responsible technology has entered mainstream debate. That ThingsCon is as a community seeking impact beyond the confined event spaces it initiates is reflected in an extract from my interview with Gabriel the 'disillusioned IoT architect' below:

I think that ThingsCon is a space where the topic is well-established, connected devices and society, where people from different backgrounds, as I mentioned previously, can go and have an open discussion, an earnest discussion, on what actually these impacts will be and what – if anything – needs to be done and maybe some projects or initiatives will come out of it. But primarily it's an exchange of information that then has wide reaching reverberations.

As Gabriel puts it, ThingsCon provides a space to discuss and exchange information on the impacts of IoT while sharing with me a belief that this has 'wide reaching reverberations' beyond the confined and temporary space designed to do so. ThingsCon founder, David, similarly attributes a potential for impact through an engagement with what ethical and responsible technology looks like in the context of IoT:

I think it provides a bit of a space to at least talk and reflect about these things. I mean, I think ThingsCon and the people we have invited has kind of shaped my way of thinking about this pretty strongly. And it's not just the talks themselves, but then you follow people on Twitter or wherever and read what other stuff they post, what they read, and then it grows. But I think through ThingsCon and the people that I have met there...it was a big impact for me. I think it's also the case for some others. I don't think, I mean, it's not the biggest event with the biggest impact on the general discourse, but I think for those that kind of touched upon ThingsCon at some moment, I think this is the impact.

David describes that ThingsCon events might not have an outspoken impact on what he explains as 'the general discourse,' but indicates the communal aspects of an influence that people mobilize together on, for instance, Twitter posts from the conference. This

expands the space created at the event for collective reflection beyond its physical walls. What I wish to illustrate with this final section is that wishes for change and impact tie into the organization of public ThingsCon events, where participants gather to collectively explore and work through troubling issues rising with the advent of IoT connective devices. This leads us back to the question asked by two ThingsCon organizers at the 2018 conference to Bowles after his talk on 'Future Ethics', that 'if you are currently employed in a company and witnessing doing harm - how can we help that person turn the ship? What actions should we take?'. This question expresses a desire for change mobilizing the risk of stepping up individually as a witness of acts in IoT companies that cause harm. This led Bowles to encourage a search for allies emphasizing the risk of intervening as an individual. A search for others finding themselves in a similar situation of ethical unease is exactly what ThingsCon participants in earlier sections of this chapter expressed moved them into this community. As Roy who hosted the ThingsCon resurrection salon explains, 'I think we're not here just to critique, we're here to show that it can be done differently.' He considers ThingsCon to be an initiative that is not just critical, but points to alternative paths for our futures with IoT technologies. In the case of Roy the act of bringing dead IoT connective devices back to life stands as an example of his point. In Chapter V, I will return to this theme of a desire for change through a question about who is supposed to act and take responsibility for ethics in IoT.

#### Conclusion

An overarching aim of this chapter has been to show how gatherings around *THINGS* across Europe do not just appear out of nowhere as my analysis of an ethical enactment of IoT in the shape of events initiated by the ThingsCon community illuminates. Things-Con gatherings traverse European borders and publicly bring together numerous participants to discuss questions about what it means to do ethical and responsible IoT. Through voices from participants in this community I have firstly shown how an individual sense of unease about the current state of IoT development and a question about whether 'anyone feels this way too' motivates their attendance in ThingsCon events where they can find 'allies' and 'fellow travellers'.

I have shown further how ethics can be seen as a tactic to move out of a moral breakdown where one must 'act' and 'keep going' inspired by the thinking of Zigon (2007, 139), a point which made it possible for me to articulate how participants respond to an individual sense of ethical unease by moving into a collective of similar minded people. While ThingsCon participants do not always feel that they have so many people around them who think about the potential consequences of IoT, they come together at ThingsCon events to gain new energy. In my analysis, I have explained how ThingsCon provides a space outside of the everyday working environments that many attendees are immersed in on an everyday basis where it might be risky to bring up topics addressed at these events. This led me into my next analytical move allowing us to better understand what

characterizes the ethical enactment of IoT and ethics that ThingsCon events instantiate, what a founder frames as 'a safe space' to explore issues of ethical and responsible IoT.

The ThingsCon community was born as a response to a lack of an 'in-between space' of IoT for practitioners involved with these emergent technologies in neither a purely 'corporate' or 'DIY'/'hacking' context. This made me wonder what characterizes this space, in an argument about how ThingsCon initiatives actively create what Douglas-Jones (2017) coins as a room for ethics that was missing. Rather than merely diving into individual processes of ethical self-cultivation and the content of discussions around ethics and IoT that take place at ThingsCon events, I combined the thinking of Douglas-Jones with Marres and Lezaun's (2011) attention towards the materiality of participatory publics. I did so to analytically grasp an enactment of ethics and IoT characterized by material settings that are carefully designed and provide conditions for a participatory public around IoT to rise around ethical matters introduced by these technologies.

What does it take to create a space to discuss what is ethically at stake in IoT together? Responding to this question, I pursued my argument about how spaces are deliberately designed for ethics 'to happen' extraordinarily at ThingsCon events and the material participation in these. I did so by zooming in on one empirical example, namely a ThingsCon salon about 'Resurrecting IoT darlings' taking place in Rotterdam May 2019. Marres and Lezaun's move beyond discourses in studies of public participation (2011, 2) in analytical dialogue with Douglas-Jones' point about how form and content fold into one another in attempts to make room for ethics (2017, 27) allowed me to articulate how the theme of the ThingsCon resurrection salon tied into its very design. A carefully selected material setting, a church, where dead IoT technologies could be brought back to life at a particular moment in time - Easter. While ThingsCon as a community caters to individual concerns about our lives with IoT, the community does so by deliberately and materially arranging a setup allowing participants to gather around questions of ethics and IoT. Contributing to ongoing discussions in the anthropological turn towards ethics, I have argued for an attention towards empirical instantiations of ethics that are materially and extraordinarily crafted to host a temporary ethical intensity in a larger collective. I argue that ethical interventions in the shape of events such as those hosted by ThingsCon are carefully designed to cultivate and compose a participatory public around IoT.

I have now analyzed the three different ethical interventions into IoT that this dissertation sets out to explore in separate chapters. In the fifth and final chapter before my concluding remarks, I wish to bring all three cases together in a comparative constellation that shows how a question about the allocation of responsibility for ethics in IoT runs through all empirical instantiations of the phenomenon. Exploring who is targeted to be ethically responsible in the respective cases and across them provide insights into how responsibility for ethics in IoT is not straightforward to place and continuously gets shifted around.

# CHAPTER V

## (Dis)placements of Ethical Responsibility



FIGURE 36. COMEST workshop on the 'Ethics of IoT', DesignLab, Twente March 2018

With this slide, the chair of the IoT-EG ethics subgroup brings the question of ethical *responsibility* for IoT in Europe into a global UNESCO forum on March 14 2018, about half a decade after the culmination of its work, at an event explicitly titled *Ethics of IoT*. The event is arranged by the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST) and hosted by the *DesignLab* at the University of Twente. As soon as I arrive at the venue after a couple of hours' train ride from Amsterdam, one of the organizers lets me know that all tickets were reserved very quickly, which he believes expresses an outspoken interest in the questions about ethics and IoT raised in this international setting.

The day offers countless reflections upon ethics and IoT from different points of departure, such as the talk on responsible innovation in IoT from where the slide above originates. The former chair of the IoT-EG ethics subgroup and main author of its IoT fact sheet, Jeroen van den Hoven, introduces points from a recent co-edited publication in the shape of a *Handbook of Ethics, Values, and Technological Design* (2015). As indicated in the title of this book, questions about ethics and values are put in direct dialogue

with the very design of emergent technologies, a theme resonating across numerous presentations and discussions throughout the day.

Exactly this take on responsibility for ethics in IoT towards the end of the event brings a participant to share a frustration of his in this public gathering. The participant believes that a great deal of responsibility for ethics in IoT is placed on the individual engineer. He shares his reflections and poses a series of critical questions to expand the collective horizon at the event for thinking about the allocation of responsibility: 'What if you ask farmers to do responsible farming? Why are regulations not on the table?' The participant emphasizes that 'ethics in IoT cannot just be an individual responsibility'. He believes that ethical responsibility should not only be carried out by technological creators and embedded in the design of IoT inventions, but must also be addressed in regulations and norms. 'How do we organize ethics?' he asks. This element of collectivity to the question of responsibility for ethics in IoT is something that echoes across the ThingsCon community, as I will now show.

The opening of this chapter mobilizes questions about an allocation of ethical responsibility in the context of IoT development. As I argue, (dis)placements of responsibility are at stake across all three empirical instantiations of ethics and IoT. A comparative constellation of *who* is targeted to act on the ethical questions that IoT technologies pose in the respective enactments of ethics that I analyze in this dissertation provides insights into just how many kinds of responsibility are involved in ethics and IoT, though these are not always explicitly framed through this concept. As numerous paradoxes in the empirical examples illuminate, placing the responsibility for taking care of ethics in IoT is not straightforward. Rather, I will now unfold how (dis)placements of responsibility are continuously mobilized in paradoxical ways, both *within* each of the three different ethical interventions into IoT and *across* them, which manifests in the comparative constellation that this chapter offers.

Anthropologists Susanna Trnka and Catherine Trundle direct our attention towards how contemporary life is pervaded by calls for responsibility along with questions about accountability (2017, 1-2). Trnka and Trundle invite us to critically pay attention to what responsibility means (Ibid., 2), arguing that we need to expand our conceptual framework in order to apprehend different enactments of responsibility and the ways in which these co-exist and compete (Ibid., 3;21). According to Trnka and Trundle, 'responsibility can reveal much about the visible and opaque workings of contemporary modes of power' (Ibid., 2). They shed light on how responsibility in the context of neoliberalism takes part in 'technologies of governance' (Ibid., 21) and 'modern forms of governmentality' (Ibid., 1). With reference to social theorist Nikolas Rose (2006) Trnka and Trundle bring up the concept of *responsibilization*, which refers 'to the increasing divestiture of obligations from the state onto individuals who are under growing pressure to formulate themselves as independent, self-managing, and self-empowered subjects' (2017, 1). Or as Rose puts

it: 'the state tries to free itself of some of the responsibilities that it acquired across the 20th century' (Rose 2001, 6 in Trnka and Trundle 2017, 5).

Yet, Trnka and Trundle insist that the concept of responsibility also reaches beyond selfresponsibility and embeds numerous meanings and enactments (2017, 3) – an analytical mission that resonates with this dissertation and its overall aim to shed light on different enactments of ethics and IoT. Trnka and Trundle articulate three overarching ways in which responsibility is enacted, analytically supporting my analysis of where responsibility for ethics and IoT is placed in the three ethical interventions that this dissertation has analyzed in the previous chapters. Firstly, they recognize the value in attending to neoliberal cultivations of self-responsibility through acts of 're-responsibilizing' (Ibid., 1;3-4). Secondly, they suggest that 'care for the Other' ties centrally into enactments of responsibility and 'an enduring commitment between parties' (Ibid., 3;12). Thirdly, Trnka and Trundle articulate an enactment of responsibility anchored in what they term a sort of 'social contract' that is characterized by 'interdependencies between larger collectivities' (Ibid., 3).

To sum up, a web of interrelations feeds into how responsibility is enacted in different ways (Ibid., 10). While the three dimensions of responsibility introduced here do not fully grasp questions mobilized in the empirical instantiations of ethics and IoT that I analyze in this dissertation, they shed light on how the ethical enactments of IoT raise different questions about who is responsible for acting. In the following sections I first look into the allocation of responsibility in the work of the IoT-EG, illuminating a European approach to ethics that would embed it into the very design of technologies. This places a certain degree of responsibility for ethics in IoT with the creators of these emergent technologies. Trnka and Trundle's thinking about responsibilization (2017, 1) enables me to critically explore this placement of responsibility on the creators of technologies that is so prominent in the work of the IoT-EG.

The Dowse box mobilizes the question about who should take responsibility for ethics in IoT rather differently. What Trnka and Trundle refer to as 'care for the Other' (Ibid., 3;12) lies at the heart of how this square white device sets out to turn IoT into a matter to care about, cultivating a capacity to ethically respond to these emergent technologies through an enhancement of our *response-ability* (Barad 2010; Yusoff 2013; Haraway and Kenney 2015). This extends the placement of responsibility for ethics in IoT to include users of these technologies. We can all work on our response-ability through this square white artifact as it ethically intervenes into IoT.

Thirdly, I turn to questions about the allocation of responsibility in the ThingsCon community where one paradox shines through especially brightly: taking on individual responsibility for ethics in IoT while calling for regulatory interventions to coordinate action. In this empirical example, while the community opens up a room to talk about what it means to do ethical IoT (ThingsCon 2020), ethics is also problematized because it somehow bypasses a question of placing a binding responsibility for action. Individual actions in the ThingsCon community echo the narrative of responsibilization in the IoT-EG case. Yet, in contrast, questions about ethics and IoT and the allocation of responsibility are dealt with collectively in an interdependent web of social relations cutting across a diversity of engagements with these technologies. Trnka and Trundle's example of an enactment of responsibility characterized by collective interdependency assists me in shedding light on this (2017, 3).

In the following I do not try to resolve the question of responsibility for ethics in IoT. Rather, I aim to analytically tease out the paradoxes of how continual (dis)placements of who is responsible to act play out. I do so in order to raise a critical discussion about the allocation of ethical responsibility in the context of IoT development as a culmination of this dissertation. As I have shown in the previous chapters, different forms of ethics and IoT matter for what can be ethically addressed. This, I now argue, also means that they target different bodies as responsible for action.

### Ethical Responsibility In IoT Technologies

In my analysis of the IoT-EG fact sheet on ethics and IoT in Chapter II I pointed to how a central theme in the approach to ethics in this expert group entails an integration of European values into the very design of IoT technologies. Inspired by the thinking of Andrew Barry (2002) I argued that agreeing on a set of values to design for was also a matter of holding Europe together in a world order destabilized in the wake of the 2008 financial crisis and rapid technological development. As Gry Hasselbalch points out, European values are threatened in this landscape, and the embedment of ethics in technology can be seen as a response to this (2019, 11).

In my analysis of what characterizes an ethical intervention into IoT in the shape of a fact sheet, I focused on an attempt by the IoT-EG to ethically order IoT in words. With reference to political theorist and STS scholar Langdon Winner (1980), Hasselbalch, in addition to this, makes a case for how forms of order are present in the very *design* of technologies with political and ethical implications (2019, 11). In doing so she directs our attention towards how values are embedded in technologies along with power relations, and technologies 'are designed in ethical or ethically problematic ways' (Ibid., 5). The implementation of ethics in technologies at the point of design characterizes an approach to technological inventions in European policymaking (Ibid., 11), a point which shines through in the case of the IoT-EG.

At the tenth IoT-EG meeting it becomes clear to the expert group that 'IoT will generate new difficulties in allocating responsibility' in situations where 'unforeseen events cause

harm, damage or any other kind of undesirable consequence' (IoT-EG 2012c, 8). A little bit later in the same meeting it is noted that 'considering consequences at the design stage is important. Design choices are not value-neutral' (Ibid., 9). Below I look into how the question about who is responsible for harm caused by IoT is dealt with in the IoT-EG's work on ethics. The very design of IoT technologies, and because of this also their creators, becomes central.

During the IoT-EG's seventh meeting the minutes convey the following reflections among the members of the expert group: 'Ethics is still at a conceptual level and it needs to become empirical' (IoT-EG 2011e, 7). Following from this: 'The coordinator explains that we [the IoT ethics subgroup] need to focus on the practical aspect of ethics' (Ibid.). What is meant with these statements exactly is not that easy to extract from the meeting minutes, but it indicates a wish to move beyond conceptual dimensions of ethics and IoT, even though the version of ethics to be delivered by the IoT-EG is a document. One topic running through the minutes speaks to this, namely the relation between technologies and values. At certain moments in the documents a distinction is made between 'the technical' and 'the non-technical' (IoT-EG 2010b, 6; IoT-EG 2011d, 5). For instance it is stated that there is a need to 'address issues such as privacy rather than technical issues' (IoT-EG 2012c, 4), as if the two kinds of issues can be separated from one another, something quite a few STS scholars would challenge (cf. Winner 1980; Akrich 1992; Suchman 2012). A common challenge comes through thoughts on how values are implemented in the very technology, as reflected in the following quotation:

The IoT raises specific ethical challenges, as well as opportunities. We must be as aware as possible of values, norms, laws, ideals and principles to ensure that they are implemented in the technology. (IoT-EG 2012b, 11)

Being aware of values, along with ensuring that these values fold into IoT connective devices, is central to the IoT-EG's response to the ethical challenges these technologies pose. As presented repeatedly at this point, the fact sheet on ethics and IoT informs on-going policy work (EC 2010a). Anthropologist Chris Shore et al. invite us to consider:

Policies as windows onto political processes in which actors, agents, concepts and technologies interact in different sites, creating or consolidating new rationalities of governance and regimes of knowledge and power. (2011, 2)

As I have shown in my analysis of the IoT-EG's written work on ethics and IoT, different actors, concepts and technologies meet across various sites in multiple documents published in the context of European policymaking. Through the thinking of Laura Stark (2011), I have shown how new realities are created through social knowledge practices in meeting minutes and the culmination of these IoT-EG gatherings in the fact sheet on ethics and IoT. The thinking of Shore et al. adds to this point that rationalities that affect

and support governance in the shape of 'regimes of knowledge and power' (2011, 2) also play out in these documents, both as windows into policies and as the political processes they entail (Ibid.). So what rationalities and regimes of knowledge find their way into the IoT-EG's work reflected in the documents that I have analyzed? And how are they either created or consolidated? In the work of the IoT-EG, the experts on IoT in the group draw on various bodies of knowledge and research that find their way into this document.

When the intertwinement of values and technology comes up in the documents, different strands and concepts from the research fields of HCI, design and engineering about how values are built into technological infrastructures become central for the work of the IoT-EG and enter these writings. This is true especially for the work on *Privacy by Design* (PbD) (IoT-EG 2011b, 4), (cf. Shapiro 2012; Spiekerman 2012; Koops et al. 2013), but also Value Sensitive Design (VSD) (IoT-EG 2011e, 7), (cf. Flanagan et al. 2008; Borning and Muller 2012; Friedman et al. 2013; Woelfer 2015). They both serve as sources of inspiration, as does the EGE's work on ethics and ICT from 2005 (IoT-EG 2011c, 5). This indicates that the IoT-EG continually seek inspiration from already ongoing and previous work as they analytically try to approach and articulate a range of challenges at stake in IoT development such as ethics.

At meeting seven a discussion around PbD is directly linked to questions of ethics when some participants suggest that 'instead of talking about privacy by design, we should talk about *ethical use by design*' (IoT-EG 2011e, 14). This resonates with Hasselbalch's observation that, almost a decade later, creating technologies that are 'ethical-by-design' (2019, 6) is an explicit aim in policy documents such as the *Resolution on Artificial Intelligence and Robotics* (2019). Hasselbalch points to how a move beyond legal compliance is at stake when the very design of technologies is a site for ethics in European policymaking in attempts 'to develop ethics by design standards and guiding principles' in a 'values based design approach' (2019, 6).

At the seventh IoT-EG meeting an interesting paragraph in the minutes highlights an argument explicitly supported by the research field of VSD about how 'when we are explicit about ethical values, it should not be seen primarily as an obstacle but rather a driver of innovation' (IoT-EG 2011e, 7). In Chapter II, I presented this moment from the IoT-EG's meeting minutes to show a belief in how ethics holds an innovative potential. For now, what is more interesting is that this assumption rests on a VSD approach to technological development that mobilizes questions about where the IoT-EG allocates responsibility for acting on ethics in IoT. 'Who is behind the technology? Can these people be trusted?' (IoT-EG2011e, 7), it is asked in the minutes from the seventh IoT-EG meeting. These questions, together with the pervasive focus on PbD and VSD, assign a central role in ethics in IoT to the creators of emergent IoT technologies.

The relations between technical and ethical aspects of technological innovation are brought up in all of the examples above that suggest privacy and other values must be integrated at the design stage, introducing the very creation process of IoT as an important moment to ethically intervene into these technologies. At the tenth IoT-EG meeting it is stated that: 'The role of engineers as "choice architects" must be recognised and managed appropriately so that principles can be developed for how to design for X, where X might be privacy, inclusion, etc.' (IoT-EG 2012c, 8). It is argued that 'the costs of failing to recognize the need for adequate design-stage data protection measures must not be underestimated' (IoT-EG 2012c, 12).

Remarks such as these in the work of the IoT-EG place a certain kind of responsibility on the developers of technologies for taking care of implementing values such as those localized by the IoT-EG at the design stage of IoT inventions. In the IoT-EG fact sheet this becomes particularly evident in reflections about the role of IoT developers and how their values, morals and worldviews influence new technologies. For example, it is stated that: 'After all, objects become agents of their developers' worldviews and morals' (Van den Hoven 2013, 15), and 'invisibility is a defining feature of IoT; but if a Panopticon scenario for IoT is plausible, how will IoT developers deal with the intolerable idea of invisibility in the "things" interaction?' (Ibid., 16). In these quotations we see that creators of IoT technologies are targeted to play a central role with regard to what worldviews and morals IoT inventions embed, and therefore also in carrying out a mission of implementing a European set of values in the design of these emergent technologies. This becomes even clearer in the following quotation where invisibility as a second defining feature of IoT and the role of design is brought up:

Miniaturization and invisibility. The desk top computer as we know it will gradually disappear or will stop to serve as the paradigm case of a computing device. Computing technology will become translucent and has the tendency to disappear from human sight. So although the functionality is prominent and ubiquitous, it will for a good part be inconspicuous or invisible. This calls for special design measures to make the technology visible and amenable to inspection, audit, quality control and accountability procedures. (Ibid., 4)

What I wish to illuminate in this section of the chapter is that the creation process of IoT technologies is localized by the IoT-EG as a central point in time to consider the values folding into new connective devices. I argue that the regimes of knowledge informing assumptions and decisions about who should act on the ethical challenges posed by IoT point to their creators, where especially PbD and VSD serve as research sources supporting the work of the IoT-EG. The IoT-EG suggests that IoT developers must act on IoT challenges and embed a European set of values into these technologies, an approach that is also reflected in VIRT-EU, a point I return to at the end of this chapter. This serves as an example of responsibilization where the neoliberal state as a technology of governance delegates responsibility to individual subjects, as Trnka and Trundle illuminate (2017, 1;21).

This allocation of responsibility is noticed by professor of management Peter Bloom, who argues that 'neoliberalism "individualizes" ethics, making us personally responsible for dealing with and resolving its moral failings' (2017, 1). Jacob Metcalf et al. similarly point to how the ways in which ethical issues are addressed in the Silicon Valley tech industry mean that 'when a problem emerges, blame can be placed on individual failure rather than institutional problems' (2019, 463). This, they add, can create the conditions for tech workers to be used as what anthropologist Madeleine Elish (2019) coins as 'liability sponges' (Ibid.). According to Bloom: 'There is a renewed emphasis on the need for an "ethics of care" to counteract the negative impacts of an individualistic and market-oriented neoliberalism' (2017, 2). This leads me to the second enactment of responsibility that Trnka and Trundle present in their threefold take on the phenomenon, namely a way of being responsible where 'care for the Other' ties centrally into how responsibility is enacted (2017, 3;12).

### Ethical Response-ability Through IoT Technologies

As analytically unfolded in Chapter III, the Dowse box ethically intervenes in a world increasingly inhabited by IoT technologies by making visible their invisible operations on our networks. I have argued that the box seeks to cultivate conditions for us to care about ethics in IoT, an argument that I now extend to demonstrate how the box, in doing so, enhances our response-ability to IoT as an 'Other' among us that we need to caringly get to know. This brings users of technologies into a cluster of ethically responsible bodies in the context of IoT.

As Trnka and Trundle look into the etymological roots of responsibility, they show how being able to respond or answer is a central component of responsibility (2017, 4). They emphasize that care contains an enduring commitment between parties (Ibid., 12). In the case of the Dowse we see how this box and its creators, through the act of making visible the invisible, are committed to making IoT knowable to us (Mol 2002, 33). The box critically intervenes in a world increasingly populated by IoT technologies through an ethical enactment where our ability to attune to IoT is enhanced to make us ethically care about the phenomenon. The Dowse box takes a critical stance towards IoT technologies, but it does not step away from them. Rather, it insists on getting closer to the invisible operations of these emergent technologies, planting seeds of care through an encouragement to get to know the connected things among us even better by engaging with the otherness that they introduce into our lives.

Attempts to enhance our responsive capacities towards what is invisible to us, here in the context of IoT, reverberates in scholarly work on invisible matters more broadly, as already introduced in Chapter III. Here I wish to illustrate how this engagement also mobilizes questions about responsibility. As promised, I now return to geographer Kathryn Yusoff's link between that which is insensible and ethics where, inspired by feminist theorist Karen Barad (2010), she brings up considerations on how to enable 'responsiveness' (2013, 208). Yusoff's work on the relation between ethics, politics and sense in moments when we face insensible and immaterial matters brings up a question about how to be responsible for 'that which disappears without trace' (Ibid., 209). Yusoff's argument for expanding our attention resonates with Maria Puig de la Bellacasa's thinking about attentional care as she makes the case that: 'We must take care of things in order to remain responsible for their becomings' (2017, 43). Yusoff and Bellacasa each bring the matter of responsibility into dialogue with something; the former with the insensible and the latter with that which we might have neglected or not cared about.

This is exactly the point where Dowse intervenes. The box responds to a sense that we do not ethically care about ethics and IoT, with a built-in assumption that this has to do with how we are unable to relate and respond to the phenomenon due to its invisibility. It therefore aims to cultivate an ability to respond to IoT by making visible the invisible, inviting us to learn about our entanglements with these technologies through hands-on experimentation. This is a rather different enactment of responsibility than the way in which the phenomenon is approached in the work of the IoT-EG. Rather than placing responsibility for ethical action on the creators of IoT, the Dowse box invites us all to work on our response-ability towards ethics and IoT. As feminist scholar Donna Haraway phrases it in conversation with Martha Kenney:

Response-ability is that cultivation through which we render each other capable, that cultivation of the capacity to respond. Response-ability is not something that you have toward some kind of demand made on you by the world or by an ethical system or by a political commitment. Response-ability is not something that you respond to, as if it's there already. Rather, it's the cultivation of the capacity of response (2015, 230-31).

Turning IoT into a matter of care through acts of making visible the invisible can be seen as a matter of enhancing our attention to disappearing technologies and their traces in order to cultivate our capacity to ethically respond to this phenomenon. As I have shown in Chapter III, this involves a number of material practices, which is why care folds into and out of the box in different ways. Dowse activates our response-ability through making visible the invisible as an ethical act that invites us to get to know IoT technologies better and care about them. As Bellacasa argues, caring for things brings with it an affective charge of ethical significance (2011, 90). To put this in the words of political theorist and philosopher Jane Bennett, 'affective attachments' play a fundamental role in ethical relations beyond the human (2001, 3;163). Cultivating affectively charged attachments appears to be characteristic of this enactment of responsibility, which targets our responseability towards IoT technologies as a prerequisite for ethically caring about these creations. The box both operates within and contains a constellation of interdependencies between numerous bodies and affects beyond the human. This brings me to a third enactment of responsibility, which I explore below in a discussion on how ethical responsibilities are assembled in the ThingsCon community.

#### A Collective of Ethical Responsibilities

#### We are observers of change.

With these words, a session on 'things we would have never imagined could happen two years ago' reaches its ending at ThingsCon Unconf in Kreuzberg, Berlin, on May 24 2019. Among the 10-15 participants attending this session, a 'pact' is made - as a closing gesture - that all will 'observe', 'keep their eyes open' and 'notice changes' brought about by the rapid development of IoT technologies. This moment from a ThingsCon event brings me to the third enactment of responsibility for ethics and IoT, or rather, one that mobilizes multiple responsibilities in what Trnka and Trundle characterize as larger collectives where interdependencies along with social contracts are in play (2017, 3).

The following reflections from members of the ThingsCon community bring up how there is a collective and contractual dimension to ethics and who is responsible for action. The empirical examples that I now introduce are full of paradoxes. Ethics is considered to reach beyond the law, yet we also seek to embed ethics in the law. PbD is suggested as a way for IoT creators to carry ethics out in practice, yet technology creators raise the critique that they operate in larger systems, which constrains the ethical choices they can make. Participants take on individual responsibility for ethics even while they call for regulation to ensure and coordinate ethical action on IoT. My analysis of ThingsCon events as ethical enactments of IoT has highlighted the collective, material and participatory characteristics of these gatherings where all kinds of bodies involved with IoT emergent technologies meet to discuss things. Keeping this in mind, regardless of how responsibility for ethics in IoT is shifted around in the following empirical extracts, members of the ThingsCon community work through questions of ethics and responsibility in IoT together.

The centrality of questions about responsibility in IoT among ThingsCon participants is very explicitly expressed in yearly publications of essays from members of the community on *The State of Responsible IoT* (RIOT) (ThingsCon 2020b; 2019b; 2018e; 2017a). During the course of my fieldwork, I noticed a transition in the ThingsCon community to increasingly articulate IoT challenges in the language of responsibility rather than ethics. I now illuminate how problems of IoT framed in the language of ethics occasionally cause worry among several members of ThingsCon. Through interviews I have discovered that this linguistic shift springs from an unease around how discussions about ethics in IoT entail a risk of bypassing legal or regulatory obligations, or other initiatives with a capacity to allocate responsibility for acting on the ethical matters posed by IoT.

#### Filling out an emptiness of ethics with responsibility

To return to my interview with the ThingsCon founder Alexander in Berlin's Prinzessinnengarten in August 2019, at some point I share with him my intuitive observation of an increasing unease with the word 'ethics' in favor of the term 'responsible' in discussions of IoT development at ThingsCon events. Reflecting upon the concept of ethics, Alexander says ethics is 'a bit of a contested term...there are ethicists who will rightfully say that it's very clearly defined, but ethics in itself doesn't mean much'. Alexander elaborates on this point: 'The usual criticism I hear about the term is that it might be a little too hand-wavy to get anyone in business to listen to it, but also that it's not legally binding, so like a thing that seems voluntary.' Alexander here addresses the issue that ethics does not entail legal obligations, and this is why, in the end, it still denotes a voluntary engagement – which is not what ThingsCon is targeting in their work towards change:

What we kind of want to go for is: look, this is not actually voluntary. If you want to be in this business or this field, this is what you absolutely need to be doing, otherwise you're not doing your job, and you're actually harming other people, groups, organizations or the environment. Or whatever it might be that you're harming, depending on the context. But you're actually creating harm by not following these rules. And responsibility makes it a little more binding.

Alexander here expresses that the concept of responsibility is more 'binding' than ethics in attempts to bring about change and minimize harm. Yet he also believes that concepts of 'ethics', 'values' and 'responsibility' are 'different manifestations of the same impulse', and regardless of the concept 'you need to fill it with life'. Another ThingsCon founder, David, expresses how difficult it is to nail down what ethics means in his response to a question of mine about whether he has noticed any changes in the discussions about ethics over the years in the ThingsCon community:

I think ethics is a bit...I know it's sometimes there, we say ethical, but every time we have to talk about what this means. And it ends up in a big discussion because no one knows, so we shouldn't be saying this because it doesn't mean anything. You have to fill it with meaning. We kind of vaguely mean good. Whatever that means.

Just like Alexander, David here expresses that 'ethics does not mean anything', and while Alexander believes that 'we have to fill it with life', David suggests we 'fill it with meaning'. While ethics in IoT is regarded as an important yet empty concept, talking about responsibility instead, according to Alexander, holds a potential to counteract this emptiness and introduce a binding commitment to not cause harm. This reflection reverberates among several ThingsCon participants in their consideration on the relation between ethics, regulation and law.

#### An Ambiguous Relation between Ethics, Laws and Regulation

While raising the critique that ethics is not 'legally binding', Alexander paradoxically shares how a rule such as 'don't break the law' is 'fine to get through life', but not what he spends his free time on. Alexander here addresses his own voluntary engagement in

ThingsCon and reveals how his ethical engagement with IoT in this community reaches beyond the law. Paradoxically, however, while considering ethics as something that cannot be confined to legal compliance he also wonders: 'Maybe we should talk about regulation more than ethics, but how do you get there, right?'

Alexander's reflections above and in this quotation illustrate an ambiguous relation between ethics, regulation and law characterized by quite a few paradoxes. As the following empirical examples indicate, the opacity of this relation brings up questions about where to allocate responsibility for acting on localized ethical issues in IoT. Not only members of the ThingsCon community in the shape of its founders, but also other participants notice some potentially problematic aspects of framing matters at stake in IoT as ethical. This ties into questions about how to ensure action on ethics and IoT which mobilizes laws and regulations as tools for allocating responsibility and prevent the risk that an ethical focus will cause the legal aspect to be bypassed.

In a follow-up interview after the ThingsCon salon in Berlin May 2019 I wish to go deeper into some of the answers given on the cards that I handed out at the event as described in the introduction. I ask Nathan about his answers, inquiring into both potentially positive and negative consequences of talking about ethics in IoT. First he reflects upon positive aspects of having conversations about ethics and IoT, with a point of departure in his written words on the card: 'Forcing discussion that...'

I think the thing about people talking about ethics and IoT now is that... there seems to be this latent demand or interest to talking about all these problematic aspects of how we work. And I'm not sure how much of it is tied to Internet of Things or late state capitalism, but there is a growing sense of discontent. And I think at least the thing with ethics is that we are starting to realize that we do need to have these conversations as we grow up, and as we end up having influence, or we start to see the unintended consequences of what we're actually doing more and more. So yes, I think it's massively overdue, but what's important to me is that people are starting to have these conversations they didn't have before. People are feeling like they're able to. There's even this kind of license to ask questions.

Nathan here describes a momentum where people are licensed to pose ethical questions that they could not ask before. According to him there is a pressing need to talk about ethics because of a discontent about problematic aspects of IoT and late state capitalism increased by unintended consequences. To my question about what might be a negative consequence of promoting ethics in IoT development Nathan responded on the card: 'Ethics washing – it being used as a way to avoid regulation'. He elaborates on his answer:

So. When you look at the history of other industries, they have looked at the idea of creating standards or self-regulation as a way to avoid being regulated themselves. Because it's much better to be able to have an institution where it's all of your mates who basically say: 'this is how we work' rather than the law saying 'this is how we work'. Because the thing about the law is that you don't always get to choose who sets the rules.

Nathan relates these reflections of his to how people might be talking about ethics:

...but without any kind of teeth. You can say 'these are the guidelines that we are going to follow', but there's no way of checking that these are being followed and there's no consequence of not following them. This is one of the downsides of this conversation about ethics that's happening here. If it's used as a replacement for having some kind of laws, you know, following actual laws with actual penalties, I think there's a danger it could just be a kind of empty exercise.

Like both Alexander and David, Nathan here addresses a problematic emptiness of ethics, in this example a potential lack of laws and consequences. Nathan goes on to reflect upon questions of (dis)incentives for compliance with, for instance, the GDPR. He explains to me that:

Some organizations will prefer to have regulation because that gives an equal playing field that everybody needs to follow. And ethics of ten voluntary things don't provide that playing field.

Like Alexander, Nathan problematizes a 'voluntary' component to ethics, relating this to questions about how to create 'an equal playing field' and introducing an element of collectivity to ethical compliance. The relation between ethics and regulation also comes up in Gabriel's answers to my questions about positive and negative consequences of promoting ethics in IoT. He worries about the allocation of responsibility for ethical action. Gabriel gave the same answer to my two contrasting questions about positive and negative aspects of promoting ethics in IoT: 'visibility and regulation'. In our interview after the salon he unfolds these three words. Resonating with Nathan's thoughts on the creation of an 'equal playing field', Gabriel brings up a question about a potential to 'coordinate action' in a regulatory assignment of responsibility pushed by debates on ethics and IoT:

I would like to hope that politicians and the people in government are paying attention to topics of emerging technologies. That when they see that there's a debate around ethics and connected devices that these topics can be then folded into future regulation. And it happens slowly, right. So the GDPR was actually pretty quick in terms of time for a problem to be recognized, in terms of time for international legislation being drafted.... And if we don't talk about these things and we don't highlight these problems, then there will never be any regulations towards them. And I believe that when you have loosely connected networks of companies working together with each other, either the fear of regulatory action can cause them to self-regulate, or some regulation will come. And regulation for me isn't a magic sword; it's not a thing that will solve this problem once and for all. And believe me, I understand that regulation can be a poison or a medicine worse than the disease, especially if it's implemented incorrectly. But I can't imagine any other way to coordinate action, to assign responsibility, to create the kinds of incentives that require these companies to behave ethically towards their consumers.

Gabriel here expresses a hope about how debates around ethics and IoT will fold into future IoT regulation, which connects to a suspicion of his towards incentives for ethical behavior in companies if a regulatory assignment of responsibility is not in place to coordinate action. Gabriel, nevertheless, turns his own point upside down, as we see in his thoughts below about potential negative consequences of promoting ethics in IoT development:

Depending on what the regulation is, you know, people may come in and say: all of the firmware for your connected device needs to be reviewed by a third party, or here's a list of 10.000 bullet points that your connected device needs to fulfil. Or anything that makes building one of these things so impossible that only companies with extremely deep pockets can even begin to compete, in essence creating a monopoly on building connected devices for the companies who have already shown that they don't really care. So that would be a problem.... And what I don't wanna have happen is an overall negative on society because we somehow made it too difficult to bring devices into the market. Or solutions to the market, or things that actually truly do help people.

Gabriel's concern that excessive regulation could make it too difficult to develop new connective devices resonates with three other answers on the cards to my question about potentially negative consequences of promoting ethics in IoT: 'Stalling required actions in urgent fields', 'Slow development', and 'Slow development - competitive countries do it faster and achieve better economic growth'. As an example, both Yvonne and Gabriel bring up scenarios of IoT inventions that it would be ethically problematic to delay in the context of climate change. Gabriel presents the following example:

If there's a magical device that pulls carbon dioxide out of the air and puts it into the ground - I'm not talking about trees, but something operating like a tree - and there's some regulatory framework that requires a sixmonth feasibility and ethics study to bring it to the market, a year's delay in such a device could be the difference between having a habitable planet and an inhabitable one.

Gabriel recognizes that this is an extreme example, but he intends to strike a point about how nothing is black and white: 'It's all in shades of grey. And that's exactly where you don't want the government coming in and trying to declare things as black and white.' I ask him about what the consequence of a governmental intervention might be: 'When you get into a situation with shades of grey and the government tries to create regulation that says "this is black and this is white", it's almost always going to be wrong'. Gabriel here paradoxically both calls for regulatory initiatives and takes a critical stance on the implementation of ethics and IoT in regulation. As he does so, he brings up a question about the risk of premature foreclosure of ethical questions in regulatory interventions into IoT that reverberates in several reflections about ethics among ThingsCon participants.

#### Acting in an Uncertain Ethical Terrain of Systemic Forces

Another answer to my question about potential negative consequences of promoting ethics in IoT came from Bob, who wrote the following sentence on his card: 'Drawing consequences earlier than we actually have a good understanding of what is going on'. This answer ties into an uncertainty about our future with IoT and addresses how there is a lot that we do not know about these technologies in the present. Bob describes to me how it is 'fragile' trying to be 'normative' right now, when there are no 'finite answers', because 'coming up too early with what is good and beautiful when we do not yet know enough might destroy both creativity and the industry'. What we talk about at this moment in time might not be relevant in five years. As a consequence of this uncertainty Bob believes that currently we have to stay open and curious rather than being too normative.

Yet, while acknowledging the danger of 'not getting things quite right' due to many unknowns, Alexander, in contrast, shares with me that it is important to still act in a terrain of ethical uncertainty: 'I think it's very important to take a stance, and even sometimes that might go wrong or you might not get it quite right or you might not phrase it correctly.' Alexander emphasizes the importance of practical examples, for instance 'about how to do privacy by design'. He lists a range of areas for reflection that are mobilized through the ThingsCon community and its ethical engagement with IoT:

When you think about a product, how do you approach thinking about fallback plans, resilience, failure modes? How do you approach thinking about what your own organizations might get wrong, what the blind spots are? And easily again it's slightly hand-wavy territory where we say, well, first of all go in humbly, don't just assume that you know the solution.... Be aware of the fact that you have biases and try to account for them as best you can. Don't make things that work perfectly, but stop working really badly. If they don't work perfectly, make sure they degrade gracefully.... That's kind of the opposite to the stereotypical Silicon Valley approach of 'we'll just launch it and scale it and if something's wrong then we will fix it later'. This is kind of the opposite approach, like, ok, we know we'll screw up, let's just make sure we don't screw up in horrible ways. And then also, maybe, you know, do it a little bit slower so there's time to reflect and learn of the things we do so we can just not fail horribly.

Alexander here makes a distinction between an approach to IoT development in Silicon Valley and Europe anchored in an ethical anticipation and attention towards blind spots and failures in a European context. In these reflections of Alexander's we see how the regime of PbD influences the approach to ethics in the ThingsCon community, yet not without a critical eye towards the systemic forces that individual developers also operate within. In his answer to a question of mine about ethical issues at stake in IoT, Nathan wrote 'Fast VC-based capitalism – and the focus on growth' in the cards from the ThingsCon salon in Berlin 2019. In an interview he explains his answer to me:

Every single time you need to make a decision to grow a company...ok, so there's a few things. The whole model for venture capitalism is basically: let's find an idea and make it grow as fast as it can.... If there's a point where people need to choose between making a company grow or doing something which would minimize harm to a particular group of people, they will almost always have incentives to grow because that's how the entire incentive structure is set up. The consequences of the existing incentive structures could, for instance, be that people design things which are really really really hard to take apart after they are created. Or people not really thinking through what happens at the end of the life of an IoT... So this stuff here we don't talk about because the incentives are in the wrong place and there isn't even regulation to force this conversation... I think this stuff is systemic.

Nathan here shares with me his thoughts on how VC-based capitalism and its incentive structure to prioritize growth at any cost is a central ethical issue at stake in IoT, adding how there is no regulation to force a conversation about this. He raises a theme about the systemic forces under which IoT developers operate, which resonates with the following consideration from ThingsCon founder David on systemic forces and capitalism as roots of a problem about ethics and IoT:

The discussions that led to the Unconf was the first time that someone in ThingsCon said: capitalism is the problem. It wasn't so explicitly political before that. But I think in general the discussion in society is changing and there is more willingness to strongly criticize technology and with it the systems in which technology is created. So this also influences ThingsCon.

David's continuation of his stream of reflections on the systems currently hosting IoT development introduces the question about where to allocate responsibility, and this, in turn, speaks to a potential problem of ethical language in IoT:

I think that by talking a lot about ethics...people make the appearance as if they are kind of ethically clean in a way. Like it's a way of whitewashing whatever you do. If any kind of company would talk a lot about ethics, bla bla bla, it would give them a good appearance... That's perhaps one risk.

David brings up an example from a keynote at a conference where someone critically addressed the allocation of ethical responsibility in a way that made David reflect upon this matter. He unfolds the argument of the presenter at the conference to me.

Everybody is talking about ethics now and it's useless because when people realized that driving a car kills people they didn't say: oh, now we need ethics training for car manufacturers and drivers. They said now we need new laws.... We are gonna fix it with like a hard barrier.... End of the story. People, designers don't need ethics trainings, programmers don't need ethics trainings to figure out for themselves what the right thing is. As a society we decide 'this is wrong'.

David introduces this example to me as a critique of a tendency to place ethical responsibility on creators of technologies through various trainings, and instead calls for societal action in the shape of laws: 'Talking a lot about ethics kind of keeps doors open that shouldn't be open anymore.' He concludes with a question: 'How much discussion needs to happen before you decide "this is our stance as a society or a government – we don't want this, we want something else"?' However, like Gabriel, he simultaneously believes that it requires 'a discussion about ethics before that to see what it is that you want to hardcode into laws'.

The focus on training developers in ethics leads us to a critical reflection on allocating responsibility for technological inventions to creators of technologies because this approach does not address systemic dimensions, as I return to shortly. This theme also speaks to the question about who gets to define ethics which, as this dissertation shows, in a European context of IoT development holds many answers with implications for the allocation of action and responsibility. Gabriel, while recognizing a diversity of participants in ThingsCon, is somewhat critical of what he sees as a 'disconnect between people who are actually building the devices and the people who are thinking about the ethics of building the devices'. Along with numerous other voices in the ThingsCon community, Gabriel here brings up the multiplicity of dimensions and interpretations of ethics at stake. In my interview with Bob in Berlin, he points out to me the importance of not only attending to whether important topics are currently left out of discussions about ethics and IoT, but also of noticing who takes part in these discussions. 'Are there important stakeholders left out of discussions?' he asks. 'How is a certain elite eligible to talk? Who has the right to tell what you should do or shouldn't do?' These questions of his culminate in an encouragement to me: go map the actors who have a voice and notice if there are some groups left out that should have something to say.

These reflections lead us back to why it is important to ask and critically inspect 'who owns ethics' (Metcalf et al. 2019). This is also true in the context of European IoT innovation, where questions about responsibility, as this chapter demonstrates, are inevitably mobilized, entangled and continuously displaced across different kinds of ethical ownership. In the ThingsCon community numerous perspectives on what it means to do ethical and responsible IoT flourish simultaneously in a place where responsibility is collectively enacted in its multiple forms in a space provided to discuss these issues, as analyzed in Chapter IV.

The empirical examples are full of paradoxes in attempts to figure out where responsibility for ethics in IoT sits, and nominees for responsible action or a lack thereof is an entanglement of individual creators, regulations, laws, capitalism, technologies, values, PbD and more. A main paradox is perhaps the individual responsibility that all participants take on as they show up at ThingsCon events where there are many calls for collective regulation to ensure ethical action on IoT. Trnka and Trundle assert that responsibility entails 'issues of responsiveness and answerability as well as agency and being capable of owning one's actions' (2017, 4) along with questions about 'individual or collective accountability' (Ibid.). At ThingsCon events, participants enact responsibility collectively as they work through all its facets, and doing so is a response to ethical challenges in IoT. They take individual responsibility together, enacting and calling for contracts with social obligations. Many big questions are mobilized in these empirical examples and there are no clear answers. I now expand these to a societal horizon.

#### Outro

The entanglement of ethics, responsibility, users, laws, regulation and the design of technologies across the three ethical interventions into IoT that I analyze in this dissertation are all dimensions at stake in technological development calling for analysis and response, according to STS professor Sheila Jasanoff (2016). Jasanoff, discussing how technological inventions 'raise ethical, legal, and social quandaries' (Ibid., 7) highlights the question of 'responsibility for risk' as a main example (Ibid.). Jasanoff notes that 'it is well-known that technologies fail, but it is less obvious who should be blamed for failures and under what circumstances' (Ibid., 21). Jasanoff questions whose role it is to predict and prevent potential harm caused by technologies and whether we even have tools available to do so (Ibid., 7). Where should responsibility be placed? In laws? In the very design of technologies? Among their creators? (Ibid., 11;15). In today's complex society these questions are not easily answered. I bring up this work by Jasanoff on ethics and technological invention since it brings attention to a question about where responsibility is located in the proliferation of ethical initiatives that runs through all the empirical cases and examples above. Who is supposed to act when we face these uncharted technological waters?

Returning to the question of ethics and IoT in VIRT-EU in the light of Jasanoff's attention towards responsibility, the process of developing IoT technologies is introduced as a site for ethics and for ethically intervening in new technologies. As stated earlier, VIRT-EU seeks to 'proactively position ethical self-assessments in the development process of IoT technologies' (CORDIS n.d.), addressing ethics at the point of design, while a publication coming out of VIRT-EU attributes importance to attending to the social milieus in which ethical actions play out (Ustek-Spilda et al. 2019).

This leads to the question of where to place ethical responsibility for new technological inventions. Winner (1977), in dialogue with the empirical examples above, expands my horizon for thinking about ethics. A paragraph from his book *Autonomous Technology: Technics-out-of-Control as a Theme in Political Thought*, written half a century ago, has recently been circulating in different online platforms for researchers engaging with our digital futures. One is the blog *Digifesto* by scientific research engineer and technology policy scholar Sebastian Benthall (2015) and another is Twitter, where it was posted by STS and political economy scholar Jathan Sadowski (2021). In a tweet on a page for the podcast on technology and political economy *This Machine Kills*, Sadowski states that Winner in this book is 'absolutely nailing the poverty of "tech ethics" as a solution for structural problems of political economy' (2021). Both Benthall and Sadowski share a quotation in which Winner brings up the question of ethics and responsibility. Winner noticed how 'contemporary calls for more ethically aware scientists and engineers' were built on the conviction that 'enlightened professionals should have a solid grasp of ethics relevant to their activities':

But, one can ask, what good will it do to nourish this moral sensibility and then place the individual in an organizational situation that mocks the very idea of responsible conduct? To pretend that the whole matter can be settled in the quiet reflections of one's soul while disregarding the context in which the most powerful opportunities for action are made available is a fundamental misunderstanding of the quality genuine responsibility must have (1977, 304-305).

Winner here problematizes acts of placing responsibility for ethics and complex technological systems on individuals without taking into consideration the larger contextual situations that constrain acting in ethically responsible ways. In line with Shosanna Zuboff, the point that Sadowski emphasizes through Winner and his own recent work, *Too Smart: How Digital Capitalism is Extracting Data, Controlling Our Lives, and Taking Over the World* (2020), is that smart technologies and IoT are part of a larger economy. That this quote by Winner is currently circulating among tech developers brings us back to the introduction of this chapter, where a participant at the COMEST event in 2018 on the 'Ethics of IoT' at the University of Twente critically raises his voice in response to a dominant tendency among participants and presenters to place responsibility with individual developers. It is a frustration echoing through many calls within the ThingsCon community for measures to collectively regulate responsible action on ethics in IoT and create an equal playing field, along with critiques of existing systems. A critique that is clearly expressed in the title of the latest yearly RIOT report: *From Good Things to Good Systems* (ThingsCon 2020b).

With regard to this PhD project the perspectives on ethics, responsibility and broader societal forces that I have just brought forward are particularly relevant for two insights springing from the empirical material I analyze in this thesis. Firstly, while an increasing number of practitioners engaged with IoT feel an individual sense of ethical unease springing from the current state of IoT development, which they actively respond to through for instance manifestos and meetups, they simultaneously express frustration and raise critiques of the systemic forces that they operate within. Secondly, I have come to learn about the challenges of how ethics is at times motivated by or absorbed into the very societal dynamics that cause ethical problems in the first place. This is a paradox which Metcalf et al. also note in their study of ethics owners in Silicon Valley:

By talking with people who are at the forefront of thinking through ethics from within the technology sector, we found that the commitment to ethics is in tension with - and at risk

of being absorbed within—broader and longer-standing industry commitments to meritocracy, technological solutionism, and market fundamentalism (2019, 470).

Trnka and Trundle believe that we can challenge dominant discourses about responsibility as a matter of responsibilization by shedding light on alternatives (2017, 22). In this chapter I have sought to do so by analytically unfolding the numerous ways in which questions about responsibility are mobilized in the enactments of ethics that this dissertation has analyzed. These become apparent in a comparative constellation of all three cases. With reference to anthropologist Ghassan Hage, Trnka and Trundle raise a question about what it means to cultivate a society of 'mutual obligation' (Hage 2003, 148 in Trnka and Trundle 2017, 22). This can only be realized if members are honored by 'the bodies that govern it' as they 'in turn, experience an ethical obligation towards it—which means nothing other than becoming practically and affectively committed to it, caring about it' (Ibid).

As I have shown throughout this dissertation, multiple bodies currently express care and commitment through their ethical interventions into IoT, revealing to us in just how many ways responsibility is mobilized and shifted around. (Dis)placements of responsibility for ethics and IoT thrive in a landscape of uncertainty that is challenging to navigate. It is beyond the scope of this research to carve out any clear paths for future action. But I do insist that we stay with the trouble (Haraway 2016) of questions about ethics, IoT and responsibility. In different enactments of ethics and IoT these matters are raised in ways that both strengthen existing tendencies and point to alternatives that can rearrange our ethical commitments towards IoT. They do so through interventions such as writings, technologies and events. Comparative ethnographies of these initiatives in the context of technological developments enable us to see what each enactment of ethics makes apparent and what it relegates to the background. Analytically teasing out these differences is part of a critical work towards making IoT and ethics knowable to us (Mol 2002, 3), and towards critically engaging with questions about ethics and IoT, along with who is targeted to take on ethical responsibility for IoT development in different enactments of the phenomenon in its multiplicity.

### CONCLUSION

Echoes of ethics currently travel across Europe in the shape of ethical interventions into the Internet of Things (IoT) technologies. In this PhD dissertation I have analyzed three different empirical instantiations of ethics and IoT to illuminate this proliferation. Recent scholarship points to a rise in explicit claims to ethics in the world of technological innovation in the Silicon Valley tech industry (Metcalf et al. 2019) and in European policymaking (Hasselbalch 2019). Nevertheless, as of yet, research investigating the 'self-described ethical' in the context of technological development has been sparse (Douglas-Jones et al. forthcoming).

My thesis contributes to this absence by exploring initiatives across Europe that are explicitly framed as ethical in the context of IoT creation through three different ethnographic points of entry: *documents, technologies*, and *events*. In a time where claims to ethics in the context of technological development rapidly multiply across and beyond European borders this research is important because it sheds light on ethical problematics introduced by emergent technologies such as IoT. However, as it does so it also points out blind angles in current initiatives engaging with ethics and IoT through a comparative constellation of empirical cases that critically shed light on one another. As each ethical intervention into IoT brings to the surface certain problems, it also leaves out or disguises others.

This dissertation stands as an ethical intervention into IoT itself through its insistence on noticing explicit claims to ethics in the context of technological development: Who gets to define ethics? What incentives and agendas are tied into a given ethical intervention into IoT or other emergent technologies such as AI, VR and Blockchain? How does its form affect what can be ethically addressed? And where is responsibility for ethics in IoT placed? In this dissertation I have made IoT and ethics knowable to us (Mol 2002, 33) by insisting on staying with the trouble (Haraway 2016) going along with enactments of ethics and IoT. I argue that we must listen to the echoes of ethics currently proliferating across Europe and ethnographically explore what they are up to.

Ethics became ethnographically apparent to me through its absence at the event Four Years From Now (4YFN) in Barcelona February 2017, when a technology developer one late afternoon sent me an email to express his gratitude towards a conversation of ours about ethics and IoT in front of his booth showcasing a new technological invention. He shared with me that ethics was a matter that he felt 'strongly about', while embodying a sense that 'no one else ever talks about it'. This dissertation, on the contrary, points to an abundance of ethics initiatives in the context of European IoT development, where an increasing number of voices and interventions currently engages with ethics and IoT. However, my dissertation concludes that they mean entirely different things. The aim of this dissertation has not been to find out what ethics and IoT inherently is, but to explore the ways in which the phenomenon is enacted from three empirical points of entry. In a comparative constellation of ethical interventions into IoT I have shown how the phenomenon in its multiple forms is enacted differently with an analytical point of departure in the thinking of ethnographer and philosopher Annemarie Mol (2002, 13). The thesis posits ethics and IoT as a phenomenon best understood through a situated analysis that takes into consideration how ethical enactments of IoT entail different practices and take varying forms. Inspired by the thinking of anthropologist Rachel Douglas-Jones I have shown how these enactments claim "real-estate" for ethics' (2017, 14-15) in their attempts to make IoT ethically knowable to us (Mol 2002, 33). My overall argument is that each enactment of ethics and IoT has a distinct form as it carves out a territory for ethics that matters for what can be ethically addressed.

The dissertation sits at an intersection of the anthropology of ethics, the anthropology of technology and science and technology studies (STS). My research contributes to ongoing discussions in the recent turn towards ethics in anthropology (Faubion 2011; Zigon 2007; Lambek 2010; Mattingly 2012; Fassin 2014; Laidlaw 2017) while moving into uncharted ethical waters empirically, methodologically and theoretically. It does so through an analytical dialogue that points to both the potentials of and limitations to ethnographic engagements with ethics that are inspired by a virtue ethical approach illuminating how people constitute themselves as virtuous beings through their ordinary practices (cf. Faubion 2011; Mattingly 2012). This approach has allowed me to analytically shed light on how an individual sense of ethical uncase tied to the current state of IoT development moves actors into deliberately seeking 'to do good'.

However, I point to a gap in existing empirical studies of ethics in this dissertation. I have responded to an ethnographic question about where one ethnographically localizes ethics (cf. Lambek 2010; Zigon 2007; Laidlaw 2017; Douglas-Jones 2013) and suggested the explicitly declared ethical as an important site of attention in the context of technological development, arguing that enactments of ethics entail material forms and practices that reach beyond the human. The dissertation thus also speaks to ongoing STS-inspired research into questions of ethics and technology where scholars explore how technologies introduce new moral judgments (Akrich 1992), mediate morality (Verbeek 2011), or embed ethics (Jasanoff 2016). This poses questions about a delegation of ethics to nonhumans (Latour 1992) such as connected technological artefacts with agentive capacities (Jørgensen 2016). While drawing on inspiration from these studies, I have rather differently explored more than human dimensions of ethics through the form and materiality of explicitly declared ethical interventions into IoT themselves. Through a comparative constellation of three ethical enactments of IoT this dissertation shows how extraordinary efforts to make room for ethics are distinct in terms of both form and content (Douglas-Jones 2017, 27), revealing to us that ethical IoT initiatives are always situated, contextual and colored by different agendas. This calls for attention in a time where claims to ethics in the development of emergent technologies proliferate on a societal scale.

Through a comparative analysis of three empirical instantiations of ethics in IoT I show how their material shapes affect the ethical message that they get across, and how different enactments of ethics and IoT inevitably embed and express varying notions of '*the good*' (Mol 2002, 176). Had I solely approached these ethnographic examples of ethics and IoT through a virtue ethical lens focusing on how individuals cultivate themselves as virtuous beings through everyday activities, I would have been able to say very little of what I have said throughout this dissertation. So what have I actually argued in each chapter feeding into this overall contribution?

In the first chapter I invited you into a portfolio of my IoT encounters so as to familiarize you with these technologies and make it easier to comprehend the ethical problematics that they raise. I enabled an encounter with IoT technologies through a weaving together of written 'strings' to analytically draw a 'figure' of IoT conveying the trouble that these technologies pose (Haraway 2016). I did so in the light of the ethical themes they raise in the enactments of ethics and IoT that I set out to analyze. I first of all asked the question: what is a thing in the context of IoT? This led me to illuminate how the *things* of IoT are made up of multiple components reaching beyond the physicality of technological artefacts. As a consequence, they are not easily either confined or defined. This became apparent in different ways in the three consecutive chapters as I pursued my analysis of empirical instantiations of ethics and IoT.

In the second chapter of this dissertation I analyzed a first ethical intervention into IoT in the shape of a document in the context of European policymaking, namely a fact sheet on ethics and IoT (Van den Hoven 2013). This piece of writing is a culmination of the work carried out by the IoT-EG and its ethics subgroup. The enactment of ethics and IoT in this case has both a *purpose* and a *form* framed by the EC: a written contribution standing as a reference for policy work under way. My overall argument was that the IoT-EG's work on ethics and IoT tied into questions about Europe's very identity and position in a world order destabilized in the wake of the 2008 financial crisis and a rapidly growing digital market.

An opening point in my analysis was that turning IoT and ethics into a written fact was not a straightforward task since the IoT-EG never managed to even agree upon what IoT is. Inspired by the thinking of Mol, together with sociologist and STS scholar John Law (2002), I illuminated how the IoT-EG ethics subgroup inevitably foregrounded certain aspects while leaving out others as it ordered the phenomenon of ethics and IoT in text. Supplementing this analytical gaze, I drew on the thinking of STS-inspired geographer Andrew Barry (2002) to show how the IoT-EG's work on the complexity of IoT and ethics was a matter of drawing the EU together as a heterogeneous state, rearranging and consolidating its position in the world order. Barry points to how committees of experts are often initiated to repair and manage variations in a diverse political body such as the EU. I argued that attempts to order ethics and IoT were a matter of both preserving a European value framework destabilized by the pace of technological development (Hasselbalch 2019), and the 2008 financial crisis. The IoT-EG carved out a territory for the ethics of IoT in different ways: through a document with its embodied material practices, and in the meetings preceding this piece of writing. Here the IoT-EG argued for the im-

#### CONCLUSION

portance of attending to questions about ethics and IoT by promoting the financial potential of paying attention to this phenomenon in an increasingly digital economy anticipated in *A Digital Agenda for Europe* (EC 2010).

In the third chapter I analyzed an entirely different ethical intervention into IoT, where questions about the very conceptual definition of these technologies were unimportant even though they took up a lot of space in the IoT-EG case. Springing from a challenge about the difficulty of relating ethically to something that is not visible to us, the Dowse box materially intervenes in a world increasingly populated by IoT technologies through enhancing our sensorial apparatus and allowing us to sense the pervasive presence of IoT that is otherwise imperceptible. My overall argument in this chapter is that the Dowse box seeks to cultivate conditions for us to care about ethics in IoT by making visible to us the invisible operations of IoT technologies on our networks.

My analysis was inspired by the thinking of Maria Puig de la Bellacasa (2017), whose work spans STS, feminist theory and environmental humanities. I showed how Dowse seeks to enable us to yet again pay attention to the disappearance of technologies encouraged by the visions of ubicomp. This square white device materially claims a territory for ethics and IoT that is invisible to us without assistance from the box. Its mission is to make us see ethics in IoT as important by enhancing our senses to cultivate care and a capacity to ethically respond to IoT. In an analytical cross-pollination of Bellacasa's work on a care ethics beyond the human and Madeleine Akrich's (1992) thinking in the field of sociology and technology, I unfolded how a range of material practices of care and scripts fold into and out of the Dowse box. It is a technological artefact that is highly influenced by the environment in which it came into being, coloring its ethical intervention into IoT and how it seeks to enhance our knowledge about the phenomenon.

In the fourth chapter, rather than looking into either a square white box or a square white document, I explored an eventful enactment of ethics and IoT in the shape of ThingsCon salons and conferences where numerous people, proto-types and IoT technologies come together to discuss *things* and the ethical questions they pose in light of their increasing connectivity. My overall argument was that these gatherings around things across Europe do not just appear out of nowhere. ThingsCon events are a particular kind of ethical enactment of IoT where material settings are carefully designed to cultivate publics in networks that traverse European borders and bring together numerous kinds of involvement with IoT development to discuss questions about ethics.

Through participation in and voices from this community I illuminated how an individual sense of unease about the current state of IoT development and a question about whether 'anyone feels this way too' motivates participants to attend ThingsCon events where they can find 'allies' and 'fellow travellers'. The thinking of anthropologist Jarrett Zigon (2007) on how ethics can be seen as a tactic to move out of a moral breakdown made it possible for me to articulate how participants act on an individual sense of unease by moving into a collective of 'similar minded people'. At ThingsCon events, participants feel they are in it together and can gain new energy. This led me to argue that ThingsCon initiatives provide an extraordinary space for ethics in IoT. My analysis as a consequence moved beyond a focus on individual processes of ethical self-cultivation and the content of discussions around ethics and IoT taking place at ThingsCon events. Instead I coupled the thinking of Douglas-Jones with STS scholar Noortje Marres and anthropologist Javier Lezaun's (2011) focus on the materiality of participatory publics. I did so to analytically grasp an enactment of ethics and IoT characterized by a carefully designed material setting providing conditions for a participatory public around IoT to rise and engage with ethical matters introduced by these technologies. I argue for an attention towards empirical instantiations of ethics that are extraordinary and temporary, contributing to ongoing discussions in the anthropological turn towards ethics and its ordinariness.

In the fifth and final chapter I initiated a comparative dialogue across all empirical instantiations of the ethical in IoT. Different claims to ethics come with different allocations of responsibility: Who is supposed to act on ethics and IoT? Who is responsible? As numerous paradoxes in the empirical examples illuminate, placing the responsibility for taking care of ethics in IoT is not straightforward. My analysis shows how (dis)placements of responsibility are continuously mobilized in paradoxical ways both *within* each of the three different empirical interventions into ethics and IoT as well as *across* them in a comparative constellation. In this analysis I was inspired by the threefold articulation of responsibility presented by anthropologists Susanna Trnka and Catherine Trundle (2017) to shed light on different ways in which the question about responsibility for ethics in IoT paradoxically presents itself in the empirical cases.

In the work of the IoT-EG towards a fact sheet on ethics and IoT, a European approach to embed ethics and values into the very design of technologies shines through. Supported by the thinking of anthropologist Chris Shore et al. on how policies are windows into studying regimes of knowledge (2011) I illuminated how the IoT-EG, by relying on research into PbD and VSD, placed a certain degree of responsibility for developing ethically viable technologies on their creators. This, I argued, could be seen as an instance of what Trnka and Trundle refer to as a *responsibilization* of individuals (2017, 1), in this case technological developers.

The Dowse box mobilizes the question of responsibility for ethics in IoT rather differently. Trnka and Trundle introduce a second enactment of responsibility characterized by 'care for the Other' (Ibid., 3;12). By turning IoT into a matter to care about, Dowse seeks to cultivate our capacity to ethically respond to these emergent technologies. It enhances our response-ability (Barad 2010; Haraway 2015), insisting that we remain responsible for the becoming of things (Bellacasa 2017) and that which disappears without a trace (Yosuff 2013). This extends the responsibility for ethics in IoT to the users of these technologies and others since we can all work on our response-ability through this square white artifact as it ethically intervenes into IoT.

I turned to the question of responsibility as enacted in ThingsCon. While the community provides a space to talk about what it means to do ethical IoT, ethics is also problematized because it somehow bypasses a question of placing a binding responsibility for action. Allocation of responsibility in the ThingsCon community especially brings forward one paradox: taking on individual responsibility for ethics in IoT while calling for collective interventions to ensure ethical compliance. Yet, even if pleas for individual action within ThingsCon echo the narrative of responsibilization in the IoT-EG, participants in this community work through questions about ethics, IoT and the allocation of responsibility together. It is an enactment of responsibility that plays out in what Trnka and Trundle refer to as 'larger collectives' (Ibid., 3) in an interdependent web of social relations cutting across a diversity of engagements with ethics and IoT.

Staying critically with the question of responsibility for ethics and IoT, towards the end of Chapter V I presented a quotation by political theorist Langdon Winner (1977) that is circulating among creators of technologies after almost half a century. In the excerpt, Langdon addresses 'contemporary calls for more ethically aware scientists an engineers', believing that responsibility for action and ethics cannot be confined to 'one's soul' in a way that simply ignores 'the organizational situation' and 'mocks the very idea of responsible conduct' (1977, 304-305). This expresses the frustration I sensed among creators of technologies in the ThingsCon community at the general ignorance of the systemic conditions they work under.

My comparative analysis of ethical interventions into IoT and the ways in which they target different bodies to act responsibly opens up a space for critically noticing where responsibility is placed and the displacement that this entails, given that multiple bodies are asked to act responsibly in paradoxical ways. In a time where claims to ethics and IoT or other emergent technologies are proliferating on a societal scale, what kind of scholarly attention do we need to pay to this rapidly evolving and expanding empirical phenomenon?

According to Bellacasa, we currently live in an 'age of ethics' (2017, 132). In this age of ethics Bellacasa critically poses a question about 'whether ethics, as it is performed in different sites, reinforces rather than challenges established orders' (Ibid.). My analysis of a comparative constellation of interventions into IoT that are explicitly coined as ethical, ethnographically and critically examines the forces that these initiatives embed and operate within. A valuable contribution of ethnographic studies engaging with ethics and technology is the critical analytical work of narrating and making different dilemmas visible (Douglas-Jones et al., forthcoming).

This dissertation is a critical engagement with ethics and IoT. However, rather than being a critique *of* ethics and IoT, or a lack thereof, its criticality springs from within, through and across the phenomenon, made up, as it is, of comparative analytical moves anchored in empirical instantiations of ethics and IoT. Trnka and Trundle believe that we can challenge dominant discourses about responsibility as a matter of responsibilization by shedding light on alternative enactments of the phenomenon (2017, 22). And it is exactly research into alternative ways of being and doing that is at the heart of ethnographic critique, according to anthropologist Ghassan Hage, who localizes an important political potential in the act of illuminating the alternatives that thrive in our midst rather than merely criticizing the status quo (2012, 285). Putting three enactments of ethics and IoT into comparative dialogue opens them up for a critical analysis that teases out exactly what they bring forward and what they relegate to the background. Through Mol's concept of a *politics-of-what* she argues that since phenomena entail different practices and ontologies (2002, 176), enactments in-

evitably also bring with them 'co-existing enactments of *the good*' (Ibid.). This leads her to ask: 'Which goods are sought after, which bads fought? And in which ways are these goodnesses set up as being good'?' (Ibid.). Ethics in the context of IoT cannot escape a critical investigation of the ways in which questions about 'the good' are always contextual and colored by agendas. My dissertation adds to this that examining different responses to ethics in IoT and the forms they take allows a space for different problems to emerge. In my dissertation I destabilize ethical orders by bringing them into an ethnographic comparative dialogue where they become prisms for exploring and attending critically to questions about ethics and IoT. We must listen to and ethnographically explore the echoes of ethics that currently proliferate across Europe in the context of technological development.

## BIBLIOGRAPHY

ADAMM. 2020. "Smart Asthma Monitoring." Accessed September 5, 2021. https://www.adamm.co.za/

Al HLEG. 2019. *Ethical Guidelines for a Trustworthy Al.* High-level expert group on Al. European Commission. Retrieved October 13 2021 from: https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trust-worthy-ai

Akrich, Madeline. 1992. "The De-Scription of Technical Objects." In *Shaping Technology, Building Society: Studies in Sociotechnical Change*, edited by Wiebe E. Bijker and John Law, 205-224. Cambridge, MA: MIT Press.

Allhoff, Fritz and Adam Henschke. 2018. "The Internet of Things: Foundational ethical issues." Internet of Things 1–2 (September): 55–66.

Andersen, Astrid Oberborbeck, Maja Hojer Bruun and Adrienne Mannov. "Antropologiske eksperimenter med fremtiden: Virtual Reality som felt og metode." *Jordens* Folk, forthcoming.

Arduino. 2018. "What is Arduino?" Introduction, Guide, Arduino. Last modified February 5, 2018. Accessed September 13, 2021. https://www.arduino.cc/en/Guide/Introduction

Armbrust, Michael, Armando Fox, Rean Griffith, Anthony D. Joseph, Randy Katz, Andy Konwinski, Gunho Lee, David Patterson, Ariel Rabkin, Ion Stoica, and Matei Zaharia. 2010. "A View of Cloud Computing". *Communications of the ACM* 33, no. 4 (April): 50-58.

Ashton, Kevin. 2009. "That 'Internet of Things' Thing." *RFID Journal.* Retrieved October 15 2021 from: http://www.itrco.jp/libraries/RFIDjournal-That%20Internet%20of%20Things%20Thing.pdf

Baarts, Charlotte. 2003. "Kapitel 2: Håndværket. Opbygning af viden". In *Ind i verden. En grundbog i antropologisk metode*, edited by Kirsten Hastrup, 35-51. Copenhagen: Hans Reitzels Forlag.

Badiou, Alain. 2001. Ethics. London: Verso.

Baldini, Gianmarco, Maarten Botterman, Ricardo Neisse and Mariachiara Tallacchini. 2016. "Ethical Design in the Internet of Things." *Sci Eng Ethics*, no. 24 (January): 905–925.

Baldwin, James. n.d. "The Blind Men and the Elephant." *Fifty Famous Stories Retold*. Gutenberg Ebook. Copy-Right American Book Company. 2006. Retrieved May 28 2021 from: https://www.gutenberg.org/files/18442/ 18442-h/18442-h.htm

Ballestero, Andrea. 2019. "Touching with Light, or, How Texture Recasts the Sensing of Underground Water." *Science, Technology, & Human Values* 44, no. 5 (July): 1-24.

Barad, Karen. 2010. "Quantum entanglements and hauntological relations of inheritance: dis/continuities, spacetime enfoldings, and justice-to-come." *Derrida Today* 3, no. 2 (October): 240–268.

Barry, Andrew. 2002. "In the Middle of the Network." In *Complexities: Social Studies of Knowledge Practices*, edited by John Law and Annemarie Mol, 142-166. Durham and London: Duke University Press.

Bell, Genevieve and Paul Dourish. 2007. "Yesterday's tomorrows: notes on ubiquitous computing's dominant vision." *Personal and Ubiquitous Computing* 11, no. 2. (January): 133-143.

Bellacasa, María Puig de la. 2017. *Matters of Care. Speculative Ethics in More Than Human Worlds.* Minneapolis, MN: University of Minnesota Press.

Bellacasa, María Puig de la. 2011. "Matters of care in technoscience: Assembling neglected things." *Social Studies of Science* 41, no. 1 (February): 85-106.

Bennett, Jane. 2001. *The Enchantment of Modern Life. Attachments, Crossings, and Ethics*. Princeton, NJ: Princeton University Press.

Benthall, Sebastian. 2015. "Responsible participation in complex sociotechnical organizations circa 1977," Digifesto. December 10, 2015. Accessed August 10, 2021. https://digifesto.com/2015/12/10/responsible-participation-in-complex-sociotechnical-organizations-circa-1977-cc-aelkus-dj\_mosfett/

Better IoT n.d. "Making good design actionable," Better IoT. Wordpress. Accessed September 8, 2021. https://betteriot.wordpress.com/

Bigos, Dan. 2017. "The Industrial Internet of Things is full of transformational potential." *IBM Business Operations Blog*. Published January 24, 2017. https://www.ibm.com/blogs/internet-of-things/iiot-has-transformational-potential/

Binder, Thomas, Ina Wagner, Giorgio de Michelis, Pelle Ehn, Giulio Jacucci and Per Linde. 2012. *Design Things*. Cambridge, MA: MIT Press.

Bjögvinsson, Erling, Pelle Ehn and Per-Anders Hillgren. 2012. "Design Things and Design Thinking: Contemporary Participatory Design Challenges." Design*Issues* 28, no. 3 (Summer): 101-116.

Blok, Anders, Trine Bøgkjær, Ester Fritsch, Cecilie Jessen Hansen, Marianne Hedegaard, Louise Nymann Jensen, Mette Marie Stahl Pedersen, and Cecilie Rubow. 2017. "UTOPIA. Kort, kollektivt feltarbejde i stor skala." *Tidsskriftet Antropologi*, no. 76. (December): 37-54.

Blue City. n.d. "Surfing the New Economy," BlueCity.nl. Accessed February 28, 2021. https://www.blue-city.nl/en/

Boellstorff, Tom. 2016. "For Whom the Ontology Turns: Theorizing the Digital Real." *Current Anthropology* 57, no. 4 (August): 387–407.

Bohn, Jürgen, Vlad Coroama, Mark Langheinrich, Friedemann Mattern, Michael Rohs. 2004. "Social, Economic, and Ethical Implications of Ambient Intelligence and Ubiquitous Computing." In *Ambient Intelligence*, edited by Werner Weber, Jan M. Rabaey, and Emile Aarts. Berlin, Heidelberg: Springer.

Borning, Alan and Michael Muller. 2012. "Next Steps for Value Sensitive Design." *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, ACM, 1125–1134.

Bowles, Cennydd. 2018. Future Ethics. Sussex: NowNext Press.

Brown, Ian and Andrew A. Adams. 2007. "The ethical challenges of ubiquitous healthcare." International Review of Information Ethics 8: 53-60.

Bruun, Maja Hojer and Ayo Wahlberg. 2021. "The Anthropology of Technology: A Handbook." In *The Palgrave Handbook of the Anthropology of Technology*, edited by Maja Hojer Bruun, Ayo Wahlberg, Rachel Douglas-Jones, Cathrine Hasse, Klaus Hoeyer, Dorthe Brogård Kristensen and Brit Ross Winthereik. Palgrave Macmillan, forthcoming.

Candea, Matei. 2007. "Arbitrary Locations: In Defence of a Bounded Fieldsite." *Journal of the Royal Anthropological Institute* 13, no. 1 (February): 167-184.

Casa Jasmina. n.d. Casajasmina.cc. Accessed September 13, 2021. http://casajasmina.cc/

Caudill, David S., Shannon N. Conley, Michael E. Gorman, and Martin Weinel. 2019. *The Third Wave in Science and Technology Studies. Future Research Directions on Expertise and Experience*. Springer International Publishing. Imprint Palgrave Macmillan.

Coleman, Simon og Peter Collins. 2006. "Introduction: Being...Where? Performing Fields in Shifting Grounds." *Locating the Field. Space, Place and Context in Anthropology*, edited by Simon Coleman og Peter Collins, 1-21. Oxford, Berg.

Collins, Harry and Robert Evans. 2007. Rethinking Expertise. University of Chicago Press.

Cook, Joanna, James Laidlaw and Jonathan Mair. 2009. "What if there is no elephant? Towards a Conception of an Un-Sited Field." In *Multi-Sited Ethnography: Theory, Praxis and Locality in Contemporary Research,* edited by Mark-Anthony Falzon, 47–74. Farnham: Ashgate.

CORDIS. n.d. "Values and ethics in Innovation for Responsible Technology in Europe." *European Commission. The Community Research and Development Information Service*. Last modified May 21, 2020. Accessed September 8, 2021. https://cordis.europa.eu/project/id/732027

CORDIS. n.d.*a*. European Commission. The Community Research and Development Information Service. "Shaping the ethical dimensions of smart information systems (SIS) – a European perspective.". Last modified August 10, 2021. Accessed September 8, 2021. https://cordis.europa.eu/project/id/786641

CORDIS. n.d.*b*. The Community Research and Development Information Service. "Responsible Ethical Learning with Robotics." Last modified August 7, 2020. Accessed September 8, 2021. https://cordis.europa.eu/project/id/731726

CORDIS. n.d.*c*. The Community Research and Development Information Service. "Ethics for Technologies with High Socio-Economic Impact." Last modified April 15, 2021. Accessed September 8, 2021. https://cordis.europa.eu/project/id/101006249

Dalsgaard, Steffen og Morten Nielsen. 2013. "Introduction. Time and the Field." *Social Analysis* 57, no. 1 (March): 1-19.

Das, Veena. 2010. "Engaging the life of the other: love and everyday life." In *Ordinary ethics: anthropology, language, and action*, edited by Michael Lambek, 376-400. New York: Fordham University Press.

Daston, Lorraine. 2008. "Introduction: Speechless." In *Things That Talk: Object Lessons from Art and Science*, edited by Lorraine Daston, 9-24. Princeton University Press.

DECODE. n.d. "Partners," decodeproject.eu. Accessed February 17, 2021. https://decodeproject.eu/partners.html

DECODE n.d.a. "Team," decodeproject.eu. Accessed February 17, 2021. https://decodeproject.eu/team.html

Deleuze, Gilles og Félix Guattari. 1987 [1980]. *A Thousand Plateaus: Capitalism and Schizophrenia*. Translated by Brian Massumi. Minneapolis, MN: University of Minnesota Press.

Deloitte. n.d. "Opting in: Using IoT connectivity to drive differentiation. The Internet of Things in insurance," Financial services, Articles, Innovation in insurance the Internet of Things IoT. Accessed May 5, 2021. https://www2.deloitte.com/tr/en/pages/financial-services/articles/innovation-in-insurance-internet-of-things-iot.html Deville, Joe, Michael Guggenheim and Zuzana Hrdličková. 2016. "Introduction: The Practices and Infrastructures of Comparison." In *Practicing Comparison. Logics, Relations, Collaborations*, edited by Joe Deville, Michael Guggenheim and Zuzana Hrdličková, 17-45. Manchester: Mattering Press.

Dewalt, Kathleen M. and Billie R. Dewalt. 2002. *Participant Observation. A Guide for Fieldworkers.* Walnut Creek, CA: AltaMira Press.

Dodge, Martin, and Rob Kitchin. 2007. "Outlines of a world coming into existence': pervasive computing and the ethics of forgetting." *Environment and Planning B: Planning and Design* 34, no. 3: 431-445.

Douglas-Jones, Rachel. "Locating Ethics: Capacity Building, Ethics Review and Research Governance Across Asia. PhD diss., Durham University, 2013.

Douglas-Jones, Rachel. 2017. "Making Room for Ethics: Spaces, Survey and Standards in the Asia-Pacific Region." *Science and Technology Studies* 30, no. 3 (September): 13-34.

Douglas-Jones, Rachel, Maja Hojer Bruun and Dorthe Brogård Kristensen. "Introduction to Section Four: Ethics, Values and Morality." In *The Palgrave Handbook of the Anthropology of Technology*, edited by Maja Hojer Bruun, Ayo Wahlberg, Rachel Douglas-Jones, Cathrine Hasse, Klaus Hoeyer, Dorthe Brogård Kristensen and Brit Ross Winthereik. Palgrave Macmillan, forthcoming.

Dourish, Paul. 2017. *The Stuff of Bits. An Essay on the Materialities of Information*. Cambridge, MA: The MIT Press.

Dowse. n.d. "Dowse." Dyne.org. Accessed February 17, 2021. https://www.dowse.eu/

Dowse. n.d.a. "FAQ," Dowse, Dyne.org. Accessed June 17, 2021. https://www.dowse.eu/faq/

Dowse. n.d.b. "Community," Dowse, Dyne.org. Accessed June 17, 2021. https://www.dowse.eu/community/

Durkheim, Emile. 1957 [1915]. The Elementary Forms of the Religious Life. London: George Allen & Unwin.

Dyne, Bonelli. 2015. Dowse Interface Design Guidelines Draft 0.4.1. Dyne.org. Federico Bonelli. Published October 6, 2015, 1-20. Retrieved October 13 2021 from: https://www.dowse.eu/wp-content/uploads/2017/12/D-InterfaceDes-0.4.pdf

Dyne. 2016. "The Thinkers and Makers behind Dowse." Youtube video. Uploaded by Dyne.org, December 6, 2016. Accessed October 13, 2021. https://www.youtube.com/watch?v=wDLyYk\_TQtI

Dyne. 2017. *Dowse Whitepaper Version 1.2.* Dyne.org Foundation. Published March 28, 2017, 1-11. Retrieved October 13 2021 from: https://files.dyne.org/dowse/dowse\_whitepaper.pdf

Dyne. n.d. dyne.org. Accessed February 17, 2021. https://www.dyne.org/

Dyne. n.d.a. "Mission." Dyne.org. Accessed February 17, 2021. https://www.dyne.org/mission/

Dyne. n.d.b. "Dowse." Dyne.org. Github. Accessed June 16, 2021. https://github.com/dyne/dowse

Dyne. n.d.c. "Dowse". Principles for the Dowse box. Retrieved May 29, 2017 from: http://dowse.eu

Ebersold, Kyle and Richard Glass. 2016. "The Internet of Things: A Cause for Ethical Concern." *Issues in Information Systems* 17, no. 4: 145-151.

EC. 2010. "A Digital Agenda for Europe." European Commission. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, 1-35. Brussels, May 19, 2010.

EC. 2010a. European Commission. "Register of Commission Experts Groups". Accessed December 11, 2018. http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetail&groupID=2514

EC. 2014. "A Digital Agenda for Europe. Rebooting Europe's Economy." European Commission, 1-8. Retrieved October 14 2021 from: https://op.europa.eu/en/publication-detail/-/publication/27a0545e-03bf-425f-8b09-7cef6f0870af

EC. n.d. "What is Horizon 2020?." *European Commission*. Accessed September 8, 2021. https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020#Article

EDPS EAG. 2018. *Towards a Digital Ethics*. European Data Protection Supervisor, Ethics Advisory Group. Retrieved October 13 2021 from: https://edps.europa.eu/sites/edp/files/publication/18-01-25\_eag\_report\_en.pdf

Elish, Madeleine Clare. 2019. "Moral Crumple Zones: Cautionary Tales in Human- Robot Interaction." *Engaging Science, Technology, and Society* 5: 40–60.

Elizalde, Daniel. n.d. "The 5 Layers of the IoT Technology Stack." Accessed September 5, 2021. https://danielelizalde.com/iot-primer/

Embroker. 2021. "How the Internet of Things is Affecting the Commercial Insurance Industry," Blog, IoT Insurance. Embroker.com. Accessed May 5, 2021. https://www.embroker.com/blog/iot-insurance/

ENISA. 2020. *Distributed denial of service*. The European Union Agency on Cybersecurity. 1-18. Retrieved October 1 2021 from: https://www.enisa.europa.eu/publications/enisa-threat-landscape-2020-distributed-denial-of-service

ESADSE. 2016. "Data Collector," Random(lab) ESADSE, Cité du design, CIEREC-UJM. Accessed September 1, 2021. https://www.esadse.fr/fr/random-lab/200917-activites?news=data-collector-1505&na

EU. 2013. "Regulation (EU) No 1291/2013 of the European Parliament and of the Council of 11 December 2013 Establishing Horizon 2020 – the Framework Programme for Research and Innovation (2014–2020) and Repealing Decision No 1982/2006/Ec". *Official Journal of the European Union*, 14–172.

EU IERC. 2016. European Research Cluster on the Internet of Things. *European Union*. Accessed September 3, 2021. http://www.internet-of-things-research.eu/

EU GDPR. 2018. General Data Protection Regulation. *European Union*. Accessed October 11, 2021. https://gdpr.eu/tag/gdpr/

Fassin, Didier. 2014. "The ethical turn in anthropology: Promises and uncertainties." *Hau: Journal of Ethno-graphic Theory* 4, no. 1 (Summer): 429–435.

Faubion, James D. 2011. An Anthropology of Ethics. Cambridge: Cambridge University Press.

Flanagan, Mary, Daniel C. Howe, and Helen Nissenbaum. 2008. "Embodying values in technology – theory and practice". In *Information Technology and Moral Philosophy*, edited by Jeroen van den Hoven and John Weckert, 322-353. Cambridge, UK: Cambridge University Press.

Foucault, Michel. 1986 [1984]. *The History of Sexuality.* Volume III: *The care of the self.* Translated by Robert Hurley. New York: Vintage Books.

Foucault, Michel. 1991 [1975]. *Discipline and punish: The birth of the prison.* Translated by Alan Sheridan. London: Penguin.

Franck, Nicolai. 2018. "Organisationer advarer mod smarte højtalere: Du aflytter dig selv." *DR*. Published October 26, 2018. Las modified October 29, 2018. https://www.dr.dk/nyheder/viden/teknologi/organisationer-advarer-mod-smarte-hoejtalere-du-aflytter-dig-selv

Friedman, Batya, Peter H. Kahn, Alan Borning, and Alina Huldtgren. 2013. "Value Sensitive Design and Information Systems." In *Early engagement and new technologies: Opening up the laboratory*, edited by Neelke Doorn, Daan Schuurbiers, Ibo van de Poel and Michael E. Gorman, 55-95. Dordrecht: Springer.

Frischhut, Markus. 2021. "The new mandate of the European Commission's ethics advisory body for science and new technologies. Further developments and larger context." EU Law Analysis. Expert insight into EU law developments. April 30, 2021. Accessed October 14, 2021. http://eulawanalysis.blogspot.com/2021/04/the-new-mandate-of-european-commissions.html

Fritsch, Ester, Irina Shklovski and Rachel Douglas-Jones. 2018. "Calling for a revolution. An analysis of IoT manifestos." In *Proceedings of the 2018 ACM Conference on Human Factors in Computing Systems (CHI '18), Montréal, April 21-26 2018*. ACM, New York, NY, USA. 1-13. Montréal: Palais des Congrés de Montréal. https://doi.org/10.1145/3173574.3173876

Fritsch, Ester, Irina Shklovski and Rachel Douglas-Jones. 2018a. "The Manifesto Moment in IoT." *RIOT. The State of responsible IoT*, 106-115. Berlin: ThingsCon e.V.

Fritsch, Ester, Marianne Hedegaard and Cecilie Rubow. 2020. "An Ecology of Notes in a Utopian Fieldwork." In *Anthropology Inside Out: Fieldworkers Taking Note*, edited by Astrid Andersen, Anne Line Dalsgård, Mette Lind Kusk, Maria Nielsen, Cecilie Rubow and Mikkel Rytter, 11-32. Herefordshire: Sean Kingston Publishing.

Gabrys, Jennifer. 2016. *Program Earth. Environmental Sensing Technology and the Making of a Computational Planet.* Minneapolis: University of Minnesota Press.

Gammeltoft, Tine. 2003. "Kapitel 13: Intimiteten. Forholdet til den anden." In *Ind i verden. En grundbog i antropologisk metode*, edited by Kirsten Hastrup, 273-297. Copenhagen: Hans Reitzels Forlag.

Gartner. 2017. "Top Trends in the Gartner Hype Cycle for Emerging Technology." Accessed September 2017. https://tinyurl.com/y76cd8qv

Gemeentemuseum. n.d. "Constant's New Babylon on permanent display," Kunstmuseum Den Haag. Accessed February 21, 2021. https://www.gemeentemuseum.nl/en/constants-new-babylon-permanent-display

Greengard, Samuel. 2015. The Internet of Things. Cambridge, MA: The MIT Press.

Greenfield, Adam. 2008. "Some guidelines for the ethical development of ubiquitous computing." *Philosophical Transactions of the Royal Society* 366: 3823-3831.

Grönvall, Erik, Jonas Fritsch and Anna Valgårda. 2016. "Feltradio: Sensing and Making Sense of Wireless Traffic." In *Proceedings of the 2016 ACM Conference on Designing Interactive Systems (DIS '16), Brisbane, June 4-8 2016*, ACM, New York, NY, USA. 829-840. Brisbane, Australia. DOI: https://doi.org/10.1145/2901790 .2901818

Gulløv, Eva og Susanne Højlund. 2003. "Kapitel 16. Konteksten. Feltens sammenhæng." In *Ind i verden. En grundbog i antropologisk metode*, edited by Kirsten Hastrup, 343-365. Copenhagen: Hans Reitzels Forlag.
Günel, Gökçe, Saiba Varma, and Chika Watanabe. 2020. "A Manifesto for Patchwork Ethnography." Member Voices, *Field-sights*, June 9. https://culanth.org/fieldsights/a-manifesto-for-patchwork-ethnography

Hage, Ghassan. 2003. Against Paranoid Nationalism. Searching for Hope in a Shrinking Society. Annandale, NSW: Pluto Press Australia.

Hage, Ghassan. 2012. "Critical anthropological thought and the radical political imaginary today." Critique of Anthropology 32, no. 3 (September): 285–308.

Hammersley, Martyn and Paul. Atkinson. 1995. "Research design: problems, cases, and samples." In *Ethnography Principles in Practice*, 23-53. London and New York: Routledge.

Haraway, Donna. 2015. "Anthropocene, Capitalocene, Chthulhucene: Donna Haraway in Conversation with Martha Kenney." In *Art in the Anthropocene: Encounters among Aesthetics, Politcs, Environments, and Epistemologies*, edited by Davis, Heather and Turpin, Etienne, 255-270. London: Open Humanities Pres.

Haraway, Donna. 2016. *Staying with the Trouble. Making Kin in the Chthulucene*. Durham and London: Duke University Press.

Hasselbalch, Gry. 2019. "Making sense of data ethics. The powers behind the data ethics debate in European policymaking." *Internet Policy Review* 8, no. 2. (June): 1-19.

Hastrup, Kirsten. 2003. "Introduktion." In *Ind i verden. En grundbog i antropologisk metode*, edited by Kirsten Hastrup, 9-35. Copenhagen: Hans Reitzels Forlag.

Hastrup, Kirsten. 2003. "Kapitel 10. Sproget. Den praktiske forståelse." In *Ind i verden. En grundbog i antro*pologisk metode, edited by Kirsten Hastrup, 207-222. Copenhagen: Hans Reitzels Forlag.

HCO. n.d. "ADAMM. For Personal Use," Health Care Originals. Accessed September 6, 2021. https://www.healthcareoriginals.com/personal/

Henare, Amiria, Martin Holbraad, and Sari Wastell. 2007. *Thinking Through Things. Theorising Artefacts Ethnographically.* Taylor and Francis.

Hern, Alex. 2018. "Cambridge Analytica: how did it turn clicks into votes?." *The Guardian*. Published May 6, 2018. Accessed December 22 2020. https://www.theguardian.com/news/2018/may/06/cambridge-analyt-ica-how-turn-clicks-into-votes-christopher-wylie

Hern, Alex. 2019. "Apple contractors 'regularly hear confidential details' on Siri recordings." *The Guardian*. Published July 26, 2019. Last modified August 2, 2019. Accessed August 9, 2021. https://www.theguard-ian.com/technology/2019/jul/26/apple-contractors-regularly-hear-confidential-details-on-siri-recordings

Hockenhull, Michael and Marisa Leavitt Cohn. 2021. "Hot air and corporate sociotechnical imaginaries: Performing and translating digital futures in the Danish tech scene." *New Media and Society* 23, no. 2 (February): 302-321.

Hojer Bruun, Maja and Ayo Wahlberg. "The Anthropology of Technology: The Formation of a Field." In *The Palgrave Handbook of the Anthropology of Technology*, edited by Maja Hojer Bruun, Ayo Wahlberg, Rachel Douglas-Jones, Cathrine Hasse, Klaus Hoeyer, Dorthe Brogård Kristensen and Brit Ross Winthereik. Palgrave Macmillan, forthcoming.

Holbraad, Martin and Morten Axel Pedersen. 2017. "Chapter 5: Things as Concepts." In *The Anthropological Turn. An Anthropological Exposition*, 199-238. Cambridge, UK: Cambridge University Press.

Horst, Maja. 2021. "Kapitel 12: Borggerinddragelse i videnskab." In *Videnskab, teknologi og samfund. En introduktion til* STS, edited by Peter Danholt and Christopher Gad, 241-261. København: Hans Reitzels Forlag.

Howell, Signe. 1997. The Ethnography of Moralities. London: Routledge.

Hughes, Thomas P. 1989. "The Evolution of Large Technological Systems." In *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, edited by Wiebe E. Bijker, Thomas P. Hughes, and Trevor Pinch, 51-82. Cambridge, MA: MIT Press.

Hume, Lynn og Jane Mulcock. 2004. "Introduction: Awkward Spaces, Productive Places." *Anthropologists in the Field. Cases in Participant Observation*, edited by Lynn Hume and Jane Mulcock, xi-xxvii. New York: Co-lumbia University Press.

Inman, Sarah and David Ribes. 2019. "Beautiful Seams: Strategic Revelations and Concealments." In *Proceedings of the 2018 ACM Conference on Human Factors in Computing Systems (CHI '19), Glasgow, May 4–9 2019.* ACM, New York, NY, USA. Paper 278, 1-13. Glasgow, Scotland. https://doi.org/10.1145/3290607

IoT Design Manifesto. 2015. Retrieved March 14 2017 from: https://www.iotmanifesto.com

Irwin, Alan and Brian Wynne. 1996. *Misunderstanding Science? The Public Reconstruction of Science and Technology*. Cambridge University Press.

Jackson, Michael. 2010. "From Anxiety to Method in Anthropological Fieldwork. An Appraisal of George Devereux's Enduring ideas." *Emotions in the field. The psychology and anthropology of Fieldwork Experience*, edited by James Davies and Dimitrina Spencer, 35-54. Stanford, CA: Stanford University Press.

Jackson, Steven J. 2014. "Chapter 11: Rethinking repair." In *Media Technologies: Essays on Communication, Materiality and Society*, edited by Tarleton Gillespie, Pablo J. Boczkowski, and Kirsten A. Foot. Cambridge, MA: MIT Press.

Jasanoff, Sheila. 2016. *The Ethics of Invention. Technology and the Human Future.* New York and London: W. W. Norton and Company.

IoT Council. 2015. "Dowse Team: The Privacy Hub for the Internet of Things," IoT Council. Last modified November 27, 2015. Accessed February 23, 2021. https://www.theinternetofthings.eu/dowse-team-privacy-hub-internet-things

IoT-EG. 2010a. *Minutes of the first Internet of Things Expert Group (IoT-EG) Meeting 22nd September 2010*. European Commission, Brussels, Pp. 1-7. Retrieved December 11 2018 from: http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetailDoc&id=7617&no=5

IoT-EG. 2010b. *Minutes of the second Internet of Things Expert Group (IoT-EG) Meeting 19 November 2010*. European Commission, Brussels, Pp. 1-10. Retrieved December 11 2018 from: http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetailDoc&id=7556&no=3

IoT-EG. 2011a. *Minutes of the third Internet of Things Expert Group (IoT-EG) Meeting 8 February 2011*. European Commission, Brussels. Pp. 1-10. Retrieved December 11 2018 from: http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetailDoc&id=7564&no=4

IoT-EG. 2011b. *Minutes of the fourth Internet of Things Expert Group (IoT-EG) Meeting 19 April 2011*. European Commission, Brussels. Pp. 1-8. Retrieved December 11 2018 from: http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetailDoc&id=7569&no=5

IoT-EG. 2011c. *Minutes of the fifth Internet of Things Expert Group (IoT-EG) Meeting 30 June 2011*. European Commission, Brussels. Pp. 1-14. Retrieved December 11 2018 from: http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetailDoc&id=7576&no=6

IoT-EG. 2011d. *Minutes of the sixth Internet of Things Expert Group (IoT-EG) Meeting 30 September 2011*. European Commission, Brussels. Pp. 1-14. Retrieved December 11 2018 from: http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetailDoc&id=7580&no=3

IoT-EG. 2011e. *Minutes of the seventh Internet of Things Expert Group (IoT-EG) Meeting 15-16 November 2011*. European Commission, Brussels. Pp. 1-18. Retrieved December 11 2018 from: http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetailDoc&id=7584&no=4

IoT-EG. 2012a. *Minutes of the eighth Internet of Things Expert Group (IoT-EG) Meeting 7 February 2012*. European Commission, Brussels. Pp. 1-12. Retrieved December 11 2018 from: http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetailDoc&id=7591&no=4

IoT-EG. 2012b. *Minutes of the ninth Internet of Things Expert Group (IoT-EG) Meeting 19-20 June 2012*. European Commission, Brussels. Pp. 1-16. Retrieved December 11 2018 from: http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetailDoc&id=7595&no=3

IoT-EG. 2012c. *Minutes of the tenth Internet of Things Expert Group (IoT-EG) Meeting 14 November 2012*. European Commission, Brussels. Pp. 1-17. Retrieved December 11 2018 from: http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetailDoc&id=7598&no=8

Jenkins, Tom. 2015. "Designing the "Things" of the IoT." In *Proceedings of the 2015 Conference on Tangible, Embedded and Embodied Interaction (TEI '15), January 15-19*, 449-452. Stanford, CA, USA. Pp. 449-452.

Jimenéz, Alberto Corsín and Chloe Nahum-Claudel. 2019. "The anthropology of traps: Concrete technologies and theoretical interfaces." *Journal of Material Culture* 24, no. 4 (January): 383-400.

Jørgensen, Finn Arne. 2016. "Chapter 3: The Internet of Things." In *A New Companion to Digital Humanities*, edited by Susan Schreibman, Ray Siemens, and John Unsworth, 42-53. Sussex: WILEY Blackwell.

Kerasidou, Xaroula. 2019. "Feminist STS and Ubiquitous Computing Investigating the Nature of the "Nature" of Ubicomp". In *digitalSTS. A Field Guide for Science & Technology Studies*, edited by Janet Vertesi and David Ribes, 99-116. Princeton: Princeton University Press.

Knox, Hannah and Dawn Nafus. 2018. *Ethnography for a data-saturated world*. Manchester: Manchester University Press.

Kolata, Justine. "A Renaissance of Salon Culture." *The European*. August 29, 2016. Retrieved October 13 2021 from: https://www.publicspheresalons.com/whysalons

Koops, Bert-Jaap, Jaap-Henk Hoepman, and Ronald Leenes. 2013. "Open-source intelligence and privacy by design." *Computer Law & Security Review* 29, no. 6 (December): 676-688).

Krøijer, Stine and Inger Sjørslev. 2018. "Kapitel 15: "At gå efter tingene: Materialitet som metode." In *Antropologiske projekter. En grundbog*, edited by Helle Bundgaard, Hanne Overgaard Mogensen, og Cecilie Rubow, 245-260. Copenhagen: Samfundslitteratur.

Laidlaw, James. 2014. *The Subject of Virtue. An Anthropology of Ethics and Freedom*. Cambridge: Cambridge University Press.

Laidlaw, James. 2017. "Ethics / Morality." In *The Cambridge Encyclopedia of Anthropology*, edited by F. Stein, S. Lazar, M. Candea, H. Diemberger, J. Robbins, A. Sanchez & R. Stasch, 1-24. http://doi.org/10.29164/17ethics

Lambek, Michael. 2010. Ordinary Ethics. Anthropology, Language, and Action. New York: Fordham University Press.

Larkin, Brian. 2008. *Signal and Noise: Infrastructure, Media and Urban Culture in Nigeria*. Durham, NC: Duke University Press.

Latour, Bruno and Steve Woolgar. 1986 [1979]. Laboratory Life. The Construction of Scientific Facts. Princeton University Press.

Latour, Bruno. 1992. "Where Are the Missing Masses: Sociology of a Few Mondane Artefacts." In *Shaping Technology/Building Society: Studies in Sociotechnical Change*, edited by Wiebe E. Bijker and John Law, 225-258. Cambridge, MA: MIT Press.

Latour, Bruno. 1993. *We Have Never Been Modern*. Translated by Catherine Porter. Cambridge, MA: Harvard University Press.

Latour, Bruno. 1999. Pandora's Hope. Cambridge, MA: Harvard University Press.

Latour, Bruno. 2003. "Why Has Critique Run Out of Steam? From Matters of Fact to Matters of Concern." *Critical Inquiry* 30, no. 2 (Winter): 151-174.

Latour, Bruno. 2004. "Whose Cosmos, Which Cosmopolitics? Comments on the Peace Term of Ulrik Beck." Symposium. Talking Peace with Gods, Part 1. *Common Knowledge* 10, no. 3: 450-462.

Latour, Bruno. 2004a. "How to talk about the body? The normative dimension of science studies." Body & Society 10, no. 2-3 (June): 205-229.

Latour, Bruno. 2005. "From Realpolitik to Dingpolitik or how to make things public." In *Making Things Public: Atmospheres of Democracy*, edited by Bruno Latour and Peter Weibel, 14-43. Cambridge MA: MIT Press, 14–43.

Latour, Bruno, Pablo Jensen, Tommaso Venturini, Sébastian Grauwin and Dominique Boullier. 2012. "'The whole is always smaller than its parts' – a digital test of Gabriel Tardes' monads." *The British Journal of Sociology* 63, no. 4 (December): 590-615.

Law, John. 1992. "Notes on the Theory of the Actor Network: Ordering, Strategy and Heterogeneity". *Systems Practice* 5, no. 4. (April): 379-393.

Ledford, Heidi. 2019. "Millions of black people affected by racial bias in health-care algorithms." *Nature.* Published October 24, 2019. Last modified October 26, 2019. Accessed August 6, 2021. https://www.nature.com/articles/d41586-019-03228-6

Lee, David. 2019. "Google admits error over hidden microphone." *BBC News*. Published February 20, 2019. Accessed September 8, 2021. https://www.bbc.com/news/technology-47303077

Lynch, Michael and Simon Cole. 2005. "Science and Technology Studies on Trial: Dilemmas of Expertise." *Social Studies of Science* 35, no. 2 (April): 269-311.

Lyon, Janet. 1999. Manifestos: Provocations of the Modern. Ithaca, NY: Cornell University Press.

MACBA. n.d. "New Babylon," Constant, Artists, Museu d'Art Contemporani de Barcelona, 2021. Accessed February 21, 2021. https://www.macba.cat/en/art-artists/artists/constant/new-babylon

MacAskill, Ewen and Gabriel Dance. 2013. "NSA Files: Decoded. What the revelations mean for you." *The Guardian*. Published November 1, 2013. Accessed August 6, 2021. https://www.theguardian.com/world/interactive/2013/nov/01/snowden-nsa-files-surveillance-revelations-decoded

MacIntyre, Alasdair. 1981. After virtue: A study in moral theory. London: Gerald Duckworth & Co.

Marcus, George. 1995. "Ethnography in/of the world system: the emergence of multi-sited ethnography." *Annual Review of Anthropology* 24 (October): 95-117.

Marr, Bernard. 2021. "How AI And Machine Learning Are Used To Transform The Insurance Industry." Bernardmarr.com. Accessed May 5, 2021. https://bernardmarr.com/how-ai-and-machine-learning-are-used-to-transform-the-insurance-industry/

Marres, Noortje and Javier Lezaun. 2011. "Materials and devices of the public: an introduction." *Economy and Society* 40, no. 4 (November): 489-509.

Mattingly, Cheryl. 2012. "Two virtue ethics and the anthropology of morality." *Anthropological Theory* 12, no. 2 (September): 161–184.

McEwen, Adrian and Hakim Cassimally. 2014. Designing the Internet of Things. Sussex: WILEY.

McOwan, Peter and Louis McCallum. 2017 [2014]. "When fridges attack: the new ethics of the Internet of Things." *The Guardian*, Published September 8, 2014. Last modified June 6 2017. https://www.theguard-ian.com/science/alexs-adventures-in-numberland/2014/sep/08/when-fridges-attack-the-new-ethics-of-the-internet-of-things

Meens, Floris. 2018. "How to Approach Salons? A Fin-de-siècle Italian Case Study." *Cultural and Social History. The Journal of the Social History Society* 18, no. 3 (February): 337-420.

Metcalf, Jacob, Emanuel Moss and danah boyd. 2019. "Owning Ethics: Corporate Logics, Silicon Valley, and the Institutionalization of Ethics." *Social Research: An International Quarterly* 82, no. 2 (Summer), 449-476.

Mitchell, Clyde. 1983. "Case and Situation Analysis." The Sociological Review 31, no. 1. (May): 187-211.

Mol, Annemarie. 2002. *The body multiple: ontology in medical practice.* Durham and London: Duke University Press.

Mol, Annemarie and John Law. 2002. "Complexities: An Introduction." In *Complexities: Social Studies of Knowledge Practices*, edited by John Law and Annemarie Mol, 1-23. Durham, NC: Duke University Press.

Mol, Annemarie. 2008. The Logic of Care: Health and the Problem of Patient Choice. New York: Routledge.

Mol, Annemarie, Ingunn Moser and Jeanette Pols. 2010. *Care in Practice. On Tinkering in Clinics, Homes and Farms.* Columbia University Press.

Moss, Emanuel and Jacob Metcalf. 2020. "Too Big a Word". *Points. Data and Society.* https://points.dataso-ciety.net/too-big-a-word-13e66e62a5bf

Mozilla n.d. "Who we are," foundation.mozilla.org. Accessed September 8, 2021. https://foundation.mozilla.org/en/who-we-are/

Mozilla n.d.*a*. "The Mozilla Foundation," foundation.mozilla.org. Accessed January 28, 2021. https://foundation.mozilla.org/en/

Mozilla. 2016. Practices for a Healthy Internet of Things. Mozilla's Open IoT Studio. University of Dundee.

Mui, Chunka. 2016. "Thinking Big About The Industrial Internet Of Things." *Forbes.* March 4, 2016. https://www.forbes.com/sites/chunkamui/2016/03/04/thinking-big-about-industrial-iot/

Narayan, Kirin. 2012. *Alive in the Writing. Crafting Ethnography in the Company of Chekhov.* Chicago and London: The University of Chicago Press.

Navne, Laura E. and Mette N. Svendsen. 2017. "Careography: Staff Experiences of Navigating Decisions in Neonatology in Denmark." *Medical Anthropology* 37, no. 3 (April): 253-266.

NGI. 2019. "NGI People & Ambassadors," NGI Introduce Yourself, NGIUpdates, NGI Community. Next Generation Internet of Things. Last modified July 5, 2019. Accessed February 17, 2021.https://spaces.fund-ingbox.com/spaces/ngi-next-generation-internet-ngi-introduce-yourself/5cd19edca25b0f0864d63b7e

Parent, Mimi. 2001. "The Poetics of the Manifesto: Nowness and Newness." In *Manifesto. A Century of* Isms, edited by Mary Ann Caws, x–xxxi. Lincoln and London: University of Nebraska Press.

Pedersen, Morten Axel, Kristoffer Albris, and Nick Seaver. 2021. "The Political Economy of Attention." Annual Review of Anthropology 50, forthcoming.

Pols, Jeanette. 2018. "Empirical ethics and the study of care." *Somatosphere*. Web publication. http://somatosphere.net/2018/11/a-readers-guide-to-the-anthropology-of-ethics-and-morality-part-iii. html

Popescul, Daniela and Mircea Georgescu. 2013. "Internet of Things – Some Ethical Issues." *The USV Annals of Economics and Public Administration* 13, no. 2: 208-214.

Preist, Chris, Dan Schien and Eli Blevis. 2016. "Understanding and Mitigating the Effects of Device and Cloud Service Design Decisions on the Environmental Footprint of Digital Infrastructure." In *Proceedings of the 2016 ACM Conference on Human Factors in Computing Systems (CHI '16), San Jose, May 7-12 2016,* 1324-1337. https://doi.org/10.1145/2858036.2858378

Riles, Annelise. 1998. "Infinity within the brackets." American Ethnologist 25, no. 3 (August): 378-398.

Riles, Annelise. 2006. "Introduction. In Response." In *Documents. Artifacts of Modern Knowledge*, edited by Annelise Riles, 1-41. The University of Michigan Press.

Robbins, Holly. "Materializing Technologies. Surfacing Focal Things and Practices with Design." PhD diss., Delft University of Technology, 2018.

Robbins, Joel. 2004. *Becoming Sinners: Christianity and Moral Torment in a Papua New Guinea Society*. Berkeley: University of California Press.

Roio, Denis. "Dowse: making visible the invisible." Algorithmic Sovereignty. PhD diss, University of Plymouth, 53-59, 2018.

Rose, David. 2014. Enchanted Objects: Design, Human Desire, and the Internet of Things. New York: Scribner.

Rose, Nikolas. 2006. *The Politics of Life Itself: Biomedicine, Power, and Subjectivity in the Twenty-First Century*. Princeton University Press.

Rubow, Cecilie. 2003. "Kapitel 11. Samtalen. Interviewet som deltagerobservation." In *Ind i verden. En grund*bog i antropologisk metode, edited by Kirsten Hastrup, 227-247. Copenhagen: Hans Reitzels Forlag. Rubow, Cecilie, Ester Fritsch and Sofie Isager Ahl. 2018. "Kapitel 3: Feltnoter: Den foreløbige skrivnings håndværk." In *Antropologiske projekter. En grundbog*, edited by Helle Bundgaard, Hanne Overgaard Mogensen, og Cecilie Rubow, 55-73. Copenhagen: Samfundslitteratur.

Rydstrøm, Helle. 2003. *Embodying Morality: Growing Up in Rural North Vietnam*. Honolulu: University of Hawaii Press.

Sadowski, Jathan. 2021. Tweet, @jathansadowski, Twitter, July 1, 2021. Accessed October 13, 2021. https://twitter.com/jathansadowski/status/1410491553450131460

Samuels, Mark. 2017. "With Teddy Bear Bluetooth Hack, 11-Year-Old Proves IoT Security Is No Child's Play." *Security Intelligence*. Published May, 2017. https://securityintelligence.com/news/with-teddy-bear-blue-tooth-hack-11-year-old-proves-iot-security-is-no-childs-play/

Scheibner, James, Anna Jobin and Effy Vayena. 2021. Ethical Issues with Using Internet of Things Devices in Citizen Science Research: A Scoping Review. *Frontiers in Environmental Science* 9 (February): 1-8.

Seaver, Nick. 2017. "Algorithms as culture: Some tactics for the ethnography of algorithmic systems." *Big Data and Society* 4, no. 2 (November): 1-12.

Shapiro, Stuart S. 2012. "The state and evolution of privacy by design." In *Proceedings of the 2012 ACM Conference on Computer and Communications Security (CCS '12),* Raleigh North Carolina USA, *October 16-18* 2012. https://doi.org/10.1145/2382196.2382324

Sharma, Neha, Madhavi Shamkuwar and Inderjit Singh. 2019. "Chapter 3: The History, Present and Future with IoT'. In *Internet of Things and Big Data Analysis for Smart Generation*, edited by Valentina E. Balas, Vijender Kumar Solanki, Raghvendra Kumar and Manju Khari, 27-52. Springer.

Shore, Chris, and Susan Wright. 2011. "Chapter 1: Conceptualizing Policy: Technologies of Governance and the Politics of Visibility." In *Policy Worlds. Anthropology and the Analysis of Contemporary Power*, edited by Chris Shore, Susan Wright and Davide Però, 1-27. Berghahn Books.

Sjørslev, Inger. 1988. "Deltagelsens dilemma. Et brasiliansk offer." In *Feltarbejde. Oplevelse og metode i et-nografien*, edited by Kirsten Hastrup og Kirsten Ramløv, 151-164. København: Akademisk Forlag.

Spiekerman, Sarah. 2012. "The Challenges of Privacy By Design." *Communications of the ACM* 55, No. 7 (July): 38-40. 10.1145/2209249.2209263

Star, Susan Leigh. 1999. "The Ethnography of Infrastructure." *American Behavioral Scientist* 43, no. 3 (November): 377–391. https://doi.org/10.1177/00027649921955326

Star, Susan Leigh and Geoffrey C. 2006. "How to Infrastructure.". In *Handbook of New Media: Social Shaping and Social Consequences of ICTs*, edited by Leah A. Lievrouw, and Sonia Livingstone, 230-245. London: SAGE.

Stark, Laura. 2011. "Meetings by the Minute(s): How Documents Create Decisions for Institutional Review Boards." In *Social Knowledge in the Making*, edited by Charles Camic, Neil Gross, and Michèle Lamont, 233-257. Chicago and London: The University of Chicago Press.

Starosielski, Nicole (2015). The undersea network. Duke University Press.

Stengers, Isabelle. 1996. *Cosmopolitiques*, vol. 1. *La guerre des sciences*. Paris: La Découverte; Les Empêcheurs de penser en rond.

Stevenson, Lisa. 2014. Life Beside Itself: Imagining Care in the Canadian Arctic. University of California Press.

Suzuki, Wakana. 2015. "The Care of the Cell." NatureCulture, no 3: 327-333.

Ticktin, Miriam I. 2011. *Casualties of Care: Immigration and the Politics of Humanitarianism in France*. University of California Press. https://www.thesocialdilemma.com

The Social Dilemma. 2020. *The Social Dilemma*. American Documentary. Directed by Jeff Orlowski. Written by Jeff Orlowski, Davis Coombe and Vickie Curtis. Accessed August 6, 2021.

ThingsCon n.d. "About," ThingsCon.org. Accessed October 7, 2020. https://www.thingscon.org/about/

ThingsCon n.d.a. "Team," About, ThingsCon.org. Accessed October 5, 2020. https://www.thingscon.org /about/team/

ThingsCon 2017. *Participant creating a nametag, ThingsCon conference Amsterdam 2017*. Photograph. Flickr. December 12, 2017. https://www.flickr.com/photos/138406953@N06/39016843831/in/album-72157690 270851834/

ThingsCon. 2017a. *The State of Responsible IoT.* Berlin: ThingsCon e.V. Retrieved October 13 2021 from: https://thingscon.org/publications/thingscon-report-the-state-of-responsible-iot-2017/

ThingsCon. 2018. "It's time for a System Reboot," Conference, ThingsCon.org. Accessed July 24, 2021. https://thingscon.org/uncategorized/conference-2018/

ThingsCon 2018a. *Captured as a note-taking participant*. Photograph. Flickr. December 25, 2018. https://www.flickr.com/photos/138406953@N06/46407594522/in/album-72157705005325064/

ThingsCon 2018b. 'Blue City' - the venue of a ThingsCon event Rotterdam 2018. Photograph. Flickr. December 25, 2018. https://www.flickr.com/photos/138406953@N06/32586012748/in/album-72157705 005325064/

ThingsCon 2018c. *Connected drinks at a ThingsCon event Rotterdam 2018*. Photograph. Flickr. December 25, 2018. https://www.flickr.com/photos/138406953@N06/46458546911/in/album-7215770500532 5064/

ThingsCon 2018d. Workshop - 'Intro to designing out waste' at a ThingsCon event Rotterdam 2018. Photograph. Flickr. December 25, 2018. https://www.flickr.com/photos/138406953@N06/44641372290/in/album-72157705005325064/

ThingsCon. 2018e. *The State of Responsible IoT.* Berlin: ThingsCon e.V. Retrieved October 13 2021 from: https://thingscon.org/wp-content/uploads/2020/03/The-State-of-Responsible-IoT-2018.pdf

ThingsCon. 2019. "Talks: Resurrecting IoT darlings / design for extended lifecycle," Salon, ThingsCon.org. Accessed January 27, 2021. https://www.meetup.com/Thingscon-Salon/events/260433006/

ThingsCon. 2019a. "Ethics and the Life Cycles of IoT," Salon, ThingsCon. Eventbrite. Accessed September 13, 2021. https://www.eventbrite.com/e/thingscon-salon-6-may-2019-ethics-and-the-life-cycles-of-iot-tickets-60115950426#

ThingsCon. 2019b. *The State of Responsible IoT. Small Escapes from Surveillance Capitalism*. Edited by Andrea Krajewski and Max Krüger. Berlin: ThingsCon e.V. Retrieved October 13 2021 from: https://thingscon.org/wp-content/uploads/2019/12/RIOT19\_Small-Escapes.pdf

ThingsCon. 2020b. *The State of Responsible IoT. From Good Things to Good Systems*. Edited by Andrea Krajew and Peter Bihr. Berlin: ThingsCon e.V. Retrieved October 13 2021 from: https://thingscon.org/wp-content/uploads/2020/12/RIOT20\_iVersion.pdf

TMMF. n.d. Torino Mini Maker Faire. "About". Accessed September 1, 2021. https://torino.makerfaire.com/about/ Trnka, Susanna and Catherine Trundle. 2017. "Introduction. Competing Responsibilities: Reckoning Personal Responsibility, Care for the Other, and the Social Contract in Contemporary Life". *Competing Responsibilities. The Ethics and Politics of Contemporary Life*, edited by Susanna Trnka and Catherine Trundle, 1-27. Durham and London: Duke University Press.

Tzafestas, Spyros G. 2018. "Ethics and Law in the Internet of Things World". *Smart Cities* 1 (October): 98–120.

Ustek-Spilda, Funda, Alison Powell and Selena Nemorin. 2019. "Engaging with ethics in Internet of Things: Imaginaries in the social milieu of technology developers". *Big Data and Society* 6, no. 2 (October): 1-12.

Ustek-Spilda, Funda, Davide Vega, Matteo Magnani, Luca Rossi, Irina Shklovski, Sebastion Lehuede, and Alison Powell. 2021. "A Twitter-based study of the European Internet of Things." *Information Systems Frontiers* 23, no. 1 (May): 135-149.

Vallor, Shannon. 2016. *Technology and the Virtues: A Philosophical Guide to a Future Worth Wanting*. Oxford University Press.

Van den Hoven, Jeroen. 2013. *Fact sheet- Ethics Subgroup IoT - Version 4.0.* Conclusions, Internet of Things Public Consultation, February 28, 2013. Pp. 1-21. The "Register of Commission Experts Groups." Retrieved December 11 2018. http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.group Detail&groupID=2514

Van den Hoven, Jeroen, Pieter E. Vermaas, and Ibo van de Poel. 2015. *Handbook of Ethics, Values, and Technological Design. Sources, Theory, Values and Application Domains*. Netherlands: Springer.

Vardi, Moshe Y. 2019. "Are We Having an Ethical Crisis in Computing?". *Communications of the ACM* 62, no. 1 (January): 7. DOI:10.1145/3292822

Verbeek, Peter-Paul. 2011. *Moralizing Technology. Understanding and Designing the Morality of Things.* Chicago and London: The University of Chicago Press.

VIRT-EU. 2019. "Virt-eu service package is now live." *Virteuproject*. Accessed September 8, 2021. https://blogit.itu.dk/virteuproject/2019/12/20/virt-eu-service-package-is-now-live/

Walford, Antonia. 2012. "Data Moves: Taking Amazonian Climate Science Seriously." *The Cambridge Journal of Anthropology* 30, no. 2 (Autumn): 101-117.

Weiser, Mark. 1991. "The Computer for the 21st century." *Scientific American* 265, no. 3 (September): 94–104.

Weiser, Mark. 1994. "The world is not a desktop." ACM Interactions 1, no. 1 (January): 7-8.

Weiser, Mark, and John Brown. 1996. "The Coming Age of Calm Technology." Xerox PARC.

Wiltse, Heather. 2020. Relating to Things: Design, Technology, and the Artificial. Bloomsbury.

Winner, Langdon. 1977. *Autonomous Technology. Technics-out-of-Control as a Theme in Political Thought.* Cambridge, MA: MIT Press.

Winner, Langdon. 1980. "Do artifacts have politics?" Daedalus 109, no. 1 (Winter): 121-136.

Winthereik, Brit Ross, James Maguire, and Laura Watts. "The Energy Walk: Infrastructuring the Imagination." In *digitalSTS. A Field Guide for Science & Technology Studies*, edited by Janet Vertesi and David Ribes, 99-116. Princeton: Princeton University Press.

Woelfer, Jill Palzkill Woelfer. 2015. "Next Steps for Value Sensitiive Design? A Practitioner's Progress." HCIC '15, Jun 28-Jul 2, Watsonville, CA.

Woolley, Jonathan. 2018. "The wires crossed: What dowsing reveals about environmental knowledge in Britain." *Anthropology Today* 34, no. 3 (June): 22-25.

Yosuff, Kathryn. 2013. "Insensible worlds: postrelational ethics, indeterminacy and the (k)nots of relating." *Environment and Planning D: Society and Space* 31, no. 2 (January): 208 – 226.

Zigon, Jarrett. 2007. "Moral breakdown and the ethical demand: A theoretical framework for an anthropology of moralities." *Anthropological Theory* 7, no. 2 (June): 131-150.

Zuboff, Shosanna. 2018. The Age of Surveillance Capitalism. The Fight for a Human Future at the New Frontier of Power. New York: PublicAffairs.